Smart Commute

A Strategy for Program Success in Addison County and Beyond

Middlebury College Environmental Studies Senior Seminar
Sustainable Transportation
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I. Introduction

Overview

Addison County Transit Resources (ACTR) is piloting a program called Smart Commute which consults with local businesses to develop individualized workplace transportation programs. The primary goal of Smart Commute is to reduce greenhouse gas emissions that contribute to the 47% of carbon from the transportation sector in Vermont. The program identifies barriers and opportunities to encourage behavior change by reducing the need to drive alone in the commute-to-work sector. Reducing solo commuting trips decreases fossil fuel consumption and provides direct savings for employees—just two benefits that a Smart Commute participant may receive.

ACTR began the pilot program in the fall of 2012 with four Addison County businesses. While the program in its first stages would ideally target businesses that are likely to embrace Smart Commute—and therefore become 'success stories' for other businesses to emulate—it lacks a formula for identifying businesses likely to succeed. This report proposes a method for choosing successful participants, and identifies the next round of businesses to target for participation in the Smart Commute Program.

Based on research, we developed a set of criteria for what makes a business likely to participate successfully in a Smart Commute program. We applied the criteria to the list of companies first by elimination, then by ranking to come up with a final list of twenty. We then identified employee clusters for as many businesses as possible using spatial analysis, to provide more information for each recommended company. The final list of twenty was presented to ACTR in December 2012. In addition to generating this final product, our multi-part method has potential application in other counties seeking to implement a Smart Commute program.

Sustainable Transportation

A critical investigation of transportation in the United States reveals two broad themes. The first: United States car-based transportation systems are fraught with social, economic, and environmental problems. These range from marginalization of people without car access, to pollution and loss of walkability that endangers health and community vitality, to excessive carbon emissions that contribute to global climate change. The second: efforts to solve these problems are evolving and strengthening. Across the country communities, advocacy groups, policy makers, and scholars herald a growing push to address flaws of the current transportation system by encouraging and implementing sustainable transportation. Schiller et al. (2010) define sustainable transportation as a system that "…allows the basic access needs of individuals and societies to be met safely and in a manner consistent with human and ecosystem health, and with equity within and between generations."

The current transportation system—and expectations for how people and goods travel—does not meet the vision of sustainability outlined above. High levels of automobile dependence and a country-wide neglect of alternative modes of movement has negative implications for human and ecosystem health—smog, oil vulnerability, and urban sprawl, to name a few (Schiller et al., 2010). This pattern also has negative implications for equity between and within generations—such as the exclusion of lower-income communities and communities of color from access to services and goods (due to low levels of car ownership combined with infrastructure designed for cars) (Polan et al., 2010), and the exacerbation of climate change by carbon dioxide, a greenhouse gas produced when burning gasoline (Bhatt et al., 2010; Schiller et al., 2010).

Arguably, the United States transportation system promotes automobiles over other forms of transit. Extensive expansion of highways since the mid-1950s, dedication of about 80% of the current federal transportation funding bill, MAP-21, ratified in June 2012, to automobile-related expenses, and city and suburban planning that leads to sprawl have all created a country of auto-centric infrastructure (Polan et al., 2010; Kooshian and Winkelman, 2011; Freemark, 2012; Ehl, 2012). As Wachs (2010) points out, this American focus on increasing individual mobility—tied to a strong American value of freedom—has certainly granted more mobility for some, but has also made vital goods and services less accessible to others—undermining another American value, equality. Automobiles require a large monetary and time investment, affecting budgets, time spent with children, and stress levels (Polan et al., 2010). Those without access to cars may have severely limited access to basic services and jobs (Polan et al., 2010; Schiller et al., 2010; Wachs, 2010). These problems, Polan et al. point out, disproportionally affect impoverished communities and communities of color. Such inequity alone is a powerful reason to lessen dependence on cars by improving alternative transportation networks. It also serves as a reminder that equitable, sustainable transportation systems should, as Wachs (2010) contends, focus on accessibility for all (ease of entering, reaching, and using transportation systems) in addition to mobility (moving people from place to place). A high dependence on car travel presents other social threats also worth addressing (Schiller et al., 2010; Kooshian and Winkelman, 2011):

- loss of walkability and increased danger in walking or biking
- decreased safety with fewer people out walking in neighborhoods
- diminished 'sense of community' from decreased daily interactions
- health threats from smog and acid rain caused by tailpipe emissions
- less opportunity for physical activity and associated health effects

Finally, carbon dioxide emissions from gasoline-burning cars present a pressing problem. Scientists agree that human-caused emission of greenhouse gasses (GHGs)—including carbon dioxide—is the leading cause of current global climate change (IPPC, 2011). Transportation accounts for about a third of all US GHG emissions (Bhatt et al., 2011). Moreover, between 1990 and 2001, half of the 27% increase in the United States' carbon dioxide emissions came from the transportation sector (Bhatt et al., 2011). Because transportation accounts for a large portion of emissions, it represents a top priority and opportunity for reduction.

Sustainable transportation aims to address the problems outlined above, from GHG emissions to inequities perpetuated by the current transportation system. As Schiller et al. (2010) argue, infrastructure and spending for both new and modified systems should emphasize multimodality, interconnectedness, and as mentioned before, accessibility in addition to mobility. Part of the solution is changing the way neighborhoods are developed to prioritize reducing distances anyone should need to travel to goods and services (for example, by making neighborhoods more compact). Kooshian and Winkelman (2011) refer to this concept as “smart growth.” In addition to smart growth, diversifying transport options in communities can foster equity, improve health, save money associated with health costs and gasoline, and contribute to reducing the extreme health, environmental, and economic risks associated with climate change.

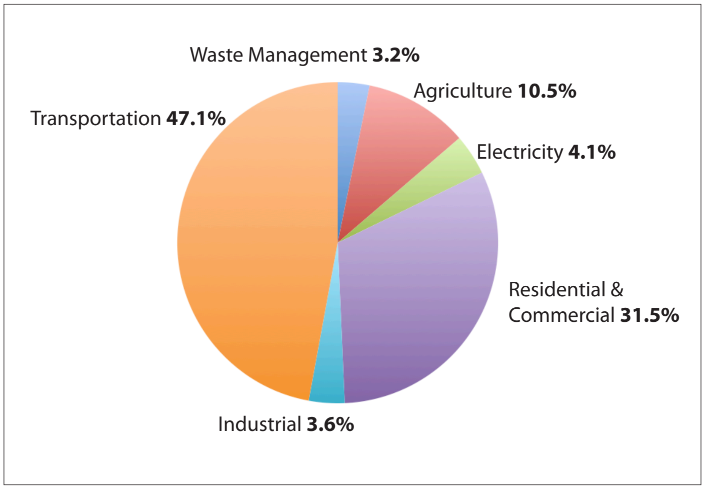

Figure 1. Vermont GHG emissions by sector (Adapted from Sears and Glitman, 2007).

Vermont represents a good opportunity for improving transportation patterns. In most regions of the United States, industry consumes more energy than any other sector Sears and Glitman, 2007). In Vermont, however, a state with limited industry (and lower carbon emissions from electricity related to use of hydropower and nuclear energy), the transportation sector uses the most energy—making transportation a worthy area in which to focus the effort to reduce emissions (Figure 1, Sears and Glitman, 2007).

Organizations, including Rails to Trails, have conducted studies that point out that individuals in rural areas are just as interested, if not more interested, in biking and walking (Pucher and Renne, 2005; Loh et al., 2012). Expanding bicycling and walking infrastructure presents a good opportunity to diversify transport options. Successful initiatives already in place in Vermont include Local Motion, a Chittenden County nonprofit that promotes “people-powered” transportation (Local Motion Website, 2012). They founded a bike ferry and series of trails, run a community bicycle shop, and coordinated a Safe Routes to School program that facilitated walking and biking to school in 22 communities. Rural areas, like Vermont, face unique difficulties diversifying transportation options where population density is too low to support an extensive network of buses and trains. Recognizing that existing public transportation networks, like ACTR, already support residents, some have called for these types of groups to also coordinate rideshare and other demand management services (Pucher and Renne, 2005; Partnership for Sustainable Communities, 2011).

ACTR, which already coordinates demand-management services like Dial-A-Ride, is poised to act on such a recommendation. ACTR received a grant from the High Meadows Fund (a branch of the Vermont Community Foundation) to pilot a Smart Commute program in Addison County. The goals of this initiative are to reduce the vehicle miles traveled for the commute-to-work sector by developing workplace transportation programs that are tailored to the needs of their employees.

What is Smart Commute?

Smart Commute programs are usually part of regional transportation management associations or TMAs. They consult with individual businesses in the region in order to create programs, services, and/or incentives to get employees to use alternatives to driving alone to work. While committed to an overall goal of reducing carbon emissions through reducing vehicle miles traveled (VMT), Smart Commute programs tend to emphasize the multiple benefits of sustainable travel modes: for example, reduced congestion and improved air quality (Smart Commute Research Triangle Website, 2012).

As a way to improve the chances a business and its employees will participate successfully, the program uses highly tailored individual and institutional behavioral analysis. When a Smart Commute program starts working with a business, it surveys individual employees and business leaders in order to assess the overall business culture and to identify two main things. First, what are the unique motivations for using sustainable transportation? Second, what are some reasons sustainable transportation options (where there currently exist) are not being utilized? Once Smart Commute identifies the motivations and barriers, the program then works with the business to implement services and financial incentives that will appeal to the employees and encourage alternatives modes of transportation. In this way, programs are tailored to the needs of each business and its employees. Ultimately, this focus on what McKenzie-Mohr (2011) calls "community-based social marketing" gives Smart Commute programs the ability to instate lasting, institutionalized changes to commuting patterns in the communities they serve.

Programs currently exist in several cities and regions including Toronto, Canada, the Research Triangle of Raleigh-Durham-Chapel Hill in North Carolina, and the Upper Valley of Eastern Vermont and Western New Hampshire. ACTR is taking the lead in developing the Addison County Smart Commute Program.

Addison County Smart Commute

The pilot Smart Commute program currently underway in Addison County is modeled on the successful Smart Commute program in the Upper Valley, run through Vital Communities, the area's transportation management association (TMA). The first round of businesses for the pilot program in Addison County are Middlebury College, the Vermont Coffee Company, the Vermont Community Foundation, and the National Bank of Middlebury. Smart Commute's tailored business survey and analysis are currently being completed for the Vermont Community Foundation.

These four businesses were chosen as initial targets based on the pilot administrators' existing relationships with these entities and knowledge of their culture, interest in green initiatives, and location. Tapping local knowledge and known community leaders to identify which businesses are likely to succeed is absolutely necessary in determining initial participants, because the goal of this pilot is to gain initial successes: businesses that enthusiastically commit to and sustain the program. Early success is critical to ensure that the program can gain momentum and visibility within the county (Brown, 2012). When the project becomes established it can better engage employers that may have more hesitations. Again, for this reason, it is critical to choose the initial participants based on personal knowledge and relationships. However, in choosing the next round of businesses, a more replicable formula is needed. It should include both individuals' knowledge of the ethos of a particular business and more objective hints (i.e., past participation in another transportation initiative) that a business will embrace Smart Commute and participate successfully. Such a formula was the focus of our group, and of this report.

Next Steps for Addison County Smart Commute

Our group worked throughout the fall of 2012 to assist the Smart Commute initiative. Our goal was to help ACTR identify the next round of Addison County businesses with the potential to become successful Smart Commute participants. We determined which businesses would be most likely to participate and adopt smart commuting policies, based on research and interviews with other Smart Commute programs. More specifically, and keeping in mind the importance of early success, we investigated the following questions:

1. What are the measures of success of a Smart Commute program?
2. What are some of the most commonly used incentives for employees to join?
3. What are some of the characteristics of successful business members?

II. Process Overview

In this section we offer an overview of our methods followed by more detailed discussion in subsequent sections. To provide a recommendation of second-round business participants in the Addison County Smart Commute program, we developed a multi-stage method. We first obtained a directory for Addison County businesses. We aimed to narrow this list of 1,857 businesses down to approximately twenty.

Next, we researched existing Smart Commute programs in order to identify characteristics of successful business participants in these places, and, ultimately, develop a list of criteria to use in identifying good candidates in Addison County. To narrow down the business list, we first eliminated companies using quantitative criteria, then ranked the remaining businesses according to qualitative criteria. These steps narrowed the list down to twenty potential businesses.

Finally, we conducted spatial analyses on select businesses from our list of twenty to reveal clusters where employees live. An employee density map and analysis can be used to inform the business of any potential commuting solutions (encouraging transit, carpooling, etc.) that could work successfully. Figure 2 outlines our approach to the research and analysis we undertook to provide a recommendation of second round business participants in the Addison County Smart Commute program.

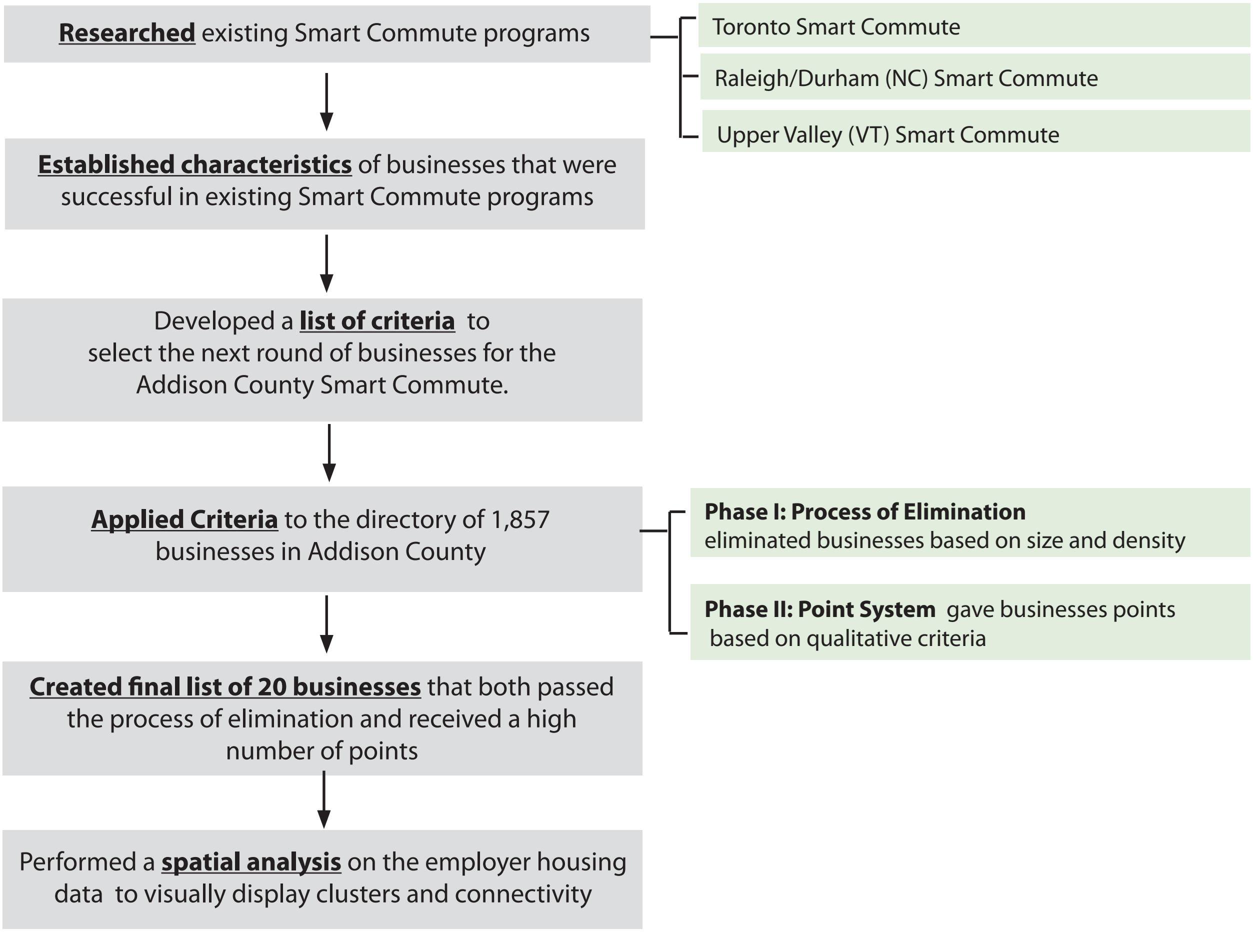
Researched existing Smart Commute programs
Toronto Smart Commute
Raleigh/Durham (NC) Smart Commute
Upper Valley (VT) Smart Commute
Established characteristics of businesses that were successful in existing Smart Commute programs
Developed a list of criteria to select the next round of businesses for the Addison County Smart Commute.
Applied Criteria to the directory of 1,857 businesses in Addison County
Phase I: Process of Elimination eliminated businesses based on size and density
Phase II: Point System gave businesses points based on qualitative criteria
Created final list of 20 businesses that both passed the process of elimination and received a high number of points
Performed a spatial analysis on the employer housing data to visually display clusters and connectivity

Figure 2. Flow Chart of our Process

III. Research

Overview of Existing Smart Commute Programs

A critical component of our project involved studying other Smart Commute programs across the United States. Our research consisted of reviewing reports and interviewing directors, where applicable. In many cases, Smart Commute programs are housed under a larger Transportation Management Association (TMA). We looked specifically for information regarding how other programs selected their businesses and reasons for why certain business commute programs failed. This research provided us with a foundational understanding of Smart Commute and highlighted reasons why some businesses were successful and why some were not (based on different measures of success; i.e. participation numbers, employee responses, etc.).

In most cases, success was dependent on both the services offered and the financial incentives that were provided. Services are wide-ranging, but focus around ensuring and coordinating rides. Some potential services include organized carpool and shuttle programs, and guaranteed ride home programs, which ensure that employees have a ride home in case of emergency.

An incentive program is often put in place to encourage sustainable behavior. Such a system recognizes and rewards employees for making smart commuting choices. Incentives may vary from one program to another, but all must have real benefits to the employee. Some potential incentives include rewards and recognition programs, discount transit passes, and daily stipends for avoiding single occupancy vehicle use.

Success was also dependent on what types of businesses joined the program, with larger businesses more likely to fund services and incentives, or contain a leader to advocate for the program. Businesses that state environmental, health or community-driven missions were also shown to be successful in existing Smart Commute programs.

In this section, we have highlighted two urban programs and one rural program: the Toronto Smart Commute program, the Raleigh/Durham North Carolina Smart Commute program and the Upper Valley Smart Commute program. For each program we will describe the general components of the initiative and then shed light on members that were successful and, if applicable, on members that were unsuccessful. Finally, we will provide general conclusions.

Toronto Smart Commute

The Smart Commute Initiative in Toronto operated from May 2004 to March 2007 as a partnership of towns, cities, and regions of the Greater Toronto and Hamilton area. In 2008, the initiative became a program of Metrolinx, an agency of the Government of Ontario to improve the coordination and integration of all modes of transportation in the area (Metrolinx, 2011). The program is delivered through a network of local transportation management associations. The goal of the program is to help employers and commuters explore different commuting choices, while easing gridlock, improving air quality and reducing greenhouse gas emissions (Smart Commute website, 2010). The Smart Commute Toronto program works with various partners and stakeholders, such as municipal and federal governments, non-profits, chambers of commerce, employers, universities, property managers, and public transit agencies (Smart Commute website, 2010). As of June 2012, there were 250 member employers and 603,800 employees and post-secondary students.

The Smart Commute Toronto program offers a diverse range of services, including carpooling and vanpooling, shuttle programs, emergency ride home programs, and financial incentives and promotions. The signature initiative of this program is Carpool Zone, a website that automatically matches commuters who live and work near each other – or along a route – based on their travel habits and preferences (Smart Commute Initiative – Effective Congestion Relief, 2007). This program is free to the public, but a premium service is available to member and partner employers of the Smart Commute program.

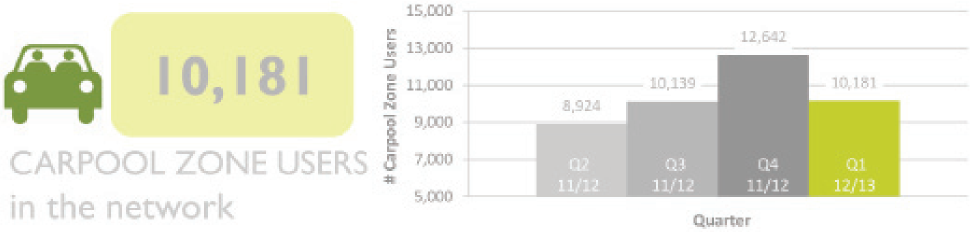

Figure 3. Smart Commute Toronto Results 2012
(Adapted from Carpool Zone Results Report)

Toronto's Smart Commute program has been quite successful, as outlined in the 2007 report "Smart Commute Initiative: Effective Congestion Relief." The program has helped to relieve congestion and protect the environmental quality of the area. More specifically, during the first three years, 10,000 cars were removed from roads each weekday, 75 million km of car travel was eliminated, and greenhouse gas emissions were reduced by more than 17,400 tonnes. To date, more than 45,100 tonnes of greenhouse gases have been eliminated and over $14 million has been saved. As of June 2012, Carpool Zone has over 10,000 users (Figure 3, Toronto Smart Commute Report, 2012).

The success of the Smart Commute program in Toronto can be credited to several factors. First, the program itself makes sure to measure its own success against a wide array of goals (congestion relief, environmental protection, improvements to public health, improvements to economy, outreach and communications). These varied measurements allow for a diversity of clients to be served and needs to be met. A business participant with interest in the environment is able to view their success in relation to fuel reduction savings or a reduced carbon footprint. Alternatively, a business participant with interest in health and wellness can view their success in terms of congestion and air pollution relief and increased physical health. The second characteristic of success for the Smart Commute program in Toronto is the variety and abundance of partners and stakeholders who provide a good deal of funding for the many initiatives. Third, members of the Smart Commute Toronto program often reference financial incentives and services for employees' needs as one of the main criteria for success. Lastly, and most importantly, the success of the program depends on employer involvement and available sustainable transportation infrastructure, as explained by Dianne Bravo, the Smart Commute Coordinator in Toronto (Bravo, 2012).

Raleigh/Durham (NC) Smart Commute

Smart Commute of Raleigh/Durham, North Carolina started in 1999 in coordination with the North Carolina Department of Transportation (Smart Commute Research Triangle, 2009). SmartCommute@rtp is the Research Triangle Park's (RTP) transportation management association. The goal of the program is to coordinate the transportation demand management efforts of organizations of the Research Triangle Park to address transportation concerns, reduce traffic congestion, and improve air quality. Today, Smart Commute represents the efforts of 29 member employers.

As a member of Smart Commute in the RTP area, employers must agree to designate a representative to attend meetings and be the contact person for their company, promote the availability of alternative commute options and benefits, and participate in the annual Smart Commute Challenge campaign (Smart Commute@rtp, 2009). Employer members of the Smart Commute program are provided with all marketing materials and signage, subsidies for new bus and vanpool riders, and free access to the Emergency Ride Home program. The success of the Smart Commute program of Raleigh/Durham stems from the use of financial incentives, and the offer of flexible workweeks and a guaranteed ride home program (Triangle Success Stories, 2004).

Upper Valley (VT) Smart Commute

The Upper Valley Transportation Management Association (TMA) piloted the Smart Commute program in 2009 with two area employers, Dartmouth Hitchcock Medical Center and Mascoma Savings Bank. The goal of this program is to reduce the number of employees driving alone, make commuting to work a more affordable and enjoyable experience, promote sustainability within the workplace, and improve traffic and parking conditions in major employment centers (Vital Communities website, 2012). More specifically, the program set out the goals as shown in Table 1, all of which were exceeded in the first year:

Table 1. Upper Valley Goals and Realized Savings. Upper Valley Transportation Management Association & Upper Valley Trails Alliance, March 2012. Smart Commute Report.

	Savings Goal	**Realized Savings**
Fuel Reduction	114,140 gallons	312,074 gallons
Cost Savings	$307,320	$1,300,000
Change in Travel Mode	Driving Alone: -2.5%	Driving Alone: -8% Carpool: +4% Transit Ridership: +4%

The Upper Valley Smart Commute program provides consulting that is tailored to the needs of each member employer. The workplace trip-reduction project aimed to research and address barriers to existing commuting options, engage employees in trying new options, develop workplace programs that incentivize new practices, and improve access to transportation options (Upper Valley TMA and Upper Valley Trails Alliance Report, 2012). The TMA offers the Smart Commute service as part of a project supported by US Department of Energy and High Meadows Fund grants.

In order to deliver an effective campaign that fosters sustainable change in commuter behaviors, the program relies on strategic research and community-based social marketing techniques (Smart Commute Upper Valley Report, 2012). Each Smart Commute employer member designates one Employer Transportation Coordinator (ETC) who is in charge of engaging employees in desired behavioral changes through the use of community-based social marketing tools. The ETC's are trained to normalize the desired behaviors, communicate materials to match employees' specific motivators, seek commitment through different prompts, follow-up with employees, and measure results. The member employers offer a wide range of incentives to try different commuting options, such as preferred carpool parking, guaranteed ride home, transit pass reimbursements, and per diem benefits.

The Upper Valley program has been quite successful. There are now over 20 members, up from 2 during the pilot program in less than 3 years. As explained by Aaron Brown, the TMA manager of Vital Communities, the program aims to reach 50 by the end of the 2014 fiscal year (Brown, 2012). According to Brown, the success of the Upper Valley Smart Commute program is highly dependent on intensive background research, marketing campaigns, and direct employee engagement. Moreover, he suggests that larger businesses with a strong leader within the company tend to be the most successful, while smaller businesses with fewer funds or interested leaders are less likely to fully implement the program and reap the benefits.

Learning from Existing Programs

In researching the successes and failures of Smart Commute programs and members, we were able to better understand the barriers to these types of programs and the incentives that make for successful initiatives.

Examples of both rural and urban Smart Commute programs can inform the Addison County program. All three examples stress the importance of using community-based social marketing, with intense up-front research and time needed. The participating organizations in the programs above benefited from a customized action plan that reflected their employees' habits, preferences, available options, and desired incentive programs. This individualized approach to developing workplace trip reduction programs has been proven quite successful (Upper Valley Transportation Management Association & Upper Valley Trails Alliance, March 2012). The first two programs benefited from having population densities and more extensive public transport systems already in place, while the Upper Valley program has succeeded despite the challenges of working in a rural area. This is an important point to consider moving forward with the even more rural Addison County Smart Commute program.

Success of many of the business participants was also dependent on what types of businesses joined the program, with larger businesses more likely to fund the program or have a leader who would champion the initiative (Brown, 2012). Moreover, businesses with environmental, health or community-driven mission statements were also shown to be successful in existing Smart Commute programs. These two characteristics informed our criteria development for selecting businesses in Addison County.

IV. Criteria: Development and Application

Rationale

Although the three preexisting Smart Commute programs outlined above operate in contexts different from the one in Addison County, there is still a great deal of information that can be applied to the Addison County Smart Commute program. Because each of the studied Smart Commute programs were implemented fairly recently, there was a lot of available material describing how these programs got off the ground. Through our research of these startup processes and communication with several program leaders, we developed much of the procedure that we ultimately used to select the second round businesses for the Addison County Smart Commute program. This research, as well as our general sustainable transportation knowledge, helped us to develop the criteria below.

Application

Criteria application consisted of two phases, an elimination phase and a point system phase. The elimination phase was necessary to narrow our directory of the 1,857 Addison County businesses to a manageable number so that we could then analyze them using the remaining criteria. After eliminating businesses with smaller employee size and towns with low employee density (our quantitative criteria), we applied a point system in which businesses were awarded one point for each qualitative criterion met. For example, if a business has a pre-existing environmental mission, it was awarded one point. We then added up the points to determine which businesses best fit our criteria. If a business met all of our criteria, it would receive the maximum six points. Each criterion and its associated points is explained in more detail below.

Phase I: Elimination

1) Large Business Size

Rationale: The majority of early-stage successful businesses for the studied Smart Commute programs had large employment numbers relative to the size of the community. With large employers, it is much more likely for there to be an employee in a position to take on a leadership role for a Smart Commute program. Additionally, large employers are generally well-known by local community members, so their adoption of the program would be highly visible to the surrounding businesses. And finally, if you were to have the same success *percentage* with participating employees for a large business and a small business, the large business would have a greater *quantity* of participating employees, and thus a greater overall reduction in VMTs, which is the ultimate goal.

Application: Kevin Behm at the Addison Country Regional Planning Commission (ACRPC) provided a list of 1,857 businesses that identifies an employee count for each business. Using this information, we narrowed down our list to 317 businesses by eliminating those with fewer than 10 employees (Figures 4, 5). Admittedly, many smaller businesses eliminated by this step might actually be considered good candidates for the program in the future, especially if clustered together and therefore potentially able to collaborate.

2) High Town Density

Rationale: Two out of the three Smart Commute programs that we studied exist in urban settings much denser than that of Addison County, and they are successful partly because of that reason. High employee density was considered important because of the greater likelihood that clusters of businesses—both in initial and later rounds of the program—can collaborate in their Smart Commute efforts.

Application: We eliminated businesses in towns with fewer than 150 total workers. To obtain the number of workers per town, we used the census data on the Longitudinal Employer-Household Dynamics (LEHD) website, specifically the OnTheMap analysis tool, which identifies where workers are employed and where they live. The data in the application are derived from Unemployment Insurance Wage Records, the Office of Personnel Management (for most Federal employees), and the Quarterly Census for Employment and Wages, but the underlying source data is confidential and not accessible to the public (OnTheMap, 2012). We performed an inflow/outflow analysis for each of the 23 towns in Addison County (Figure 6, for full tabular results see Appendix Table 2). This analysis revealed the number of people entering a designated town for work, and leaving the town to work elsewhere. The following towns were eliminated because they had fewer than 150 total workers: Cornwall, Goshen, Granville, Hancock, Leicester, Lincoln, Panton, Ripton, Starksboro, Whiting, Weybridge, and Waltham (Table 2). After this second round of elimination, our list narrowed to 299 businesses. We then transitioned to Phase II of criteria application, where we ranked businesses according to three qualitative criteria.

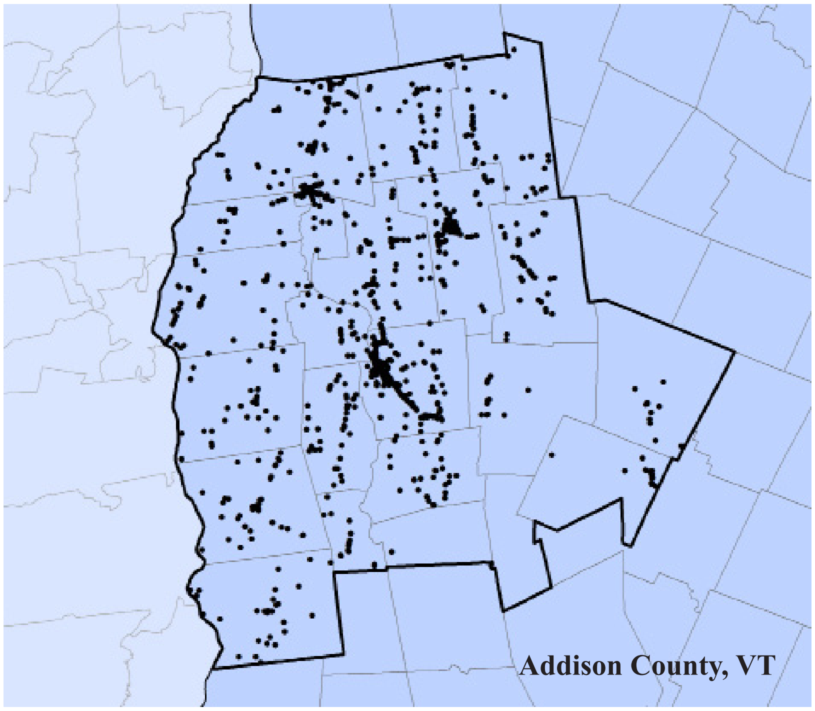

Figure 4. Original set of 1,857 businesses in Addison County.

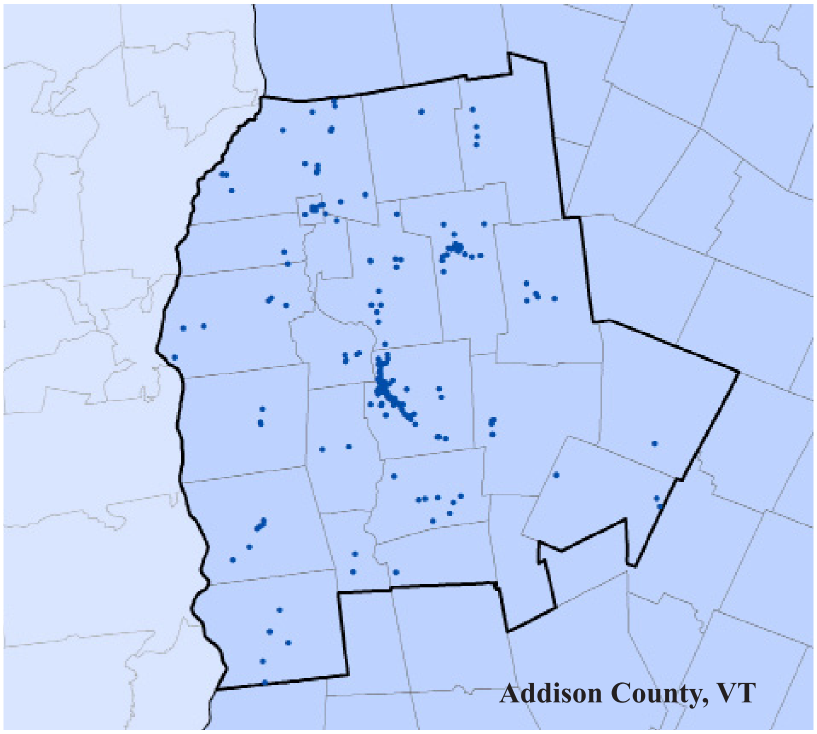

Figure 5. 317 businesses remained after the employee size (<10) elimination.

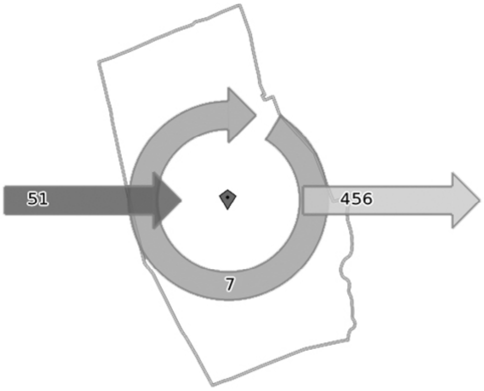

Figure 6. Inflow-Outflow Map of Cornwall. 51 people commute into Cornwall for work, 456 people leave Cornwall for work, and 7 people live and work in Cornwall.

Table 2. Towns with fewer than 150 workers.

Town	# of workers
Cornwall	58
Goshen	13
Granville	24
Hancock	35
Leicester	46
Lincoln	64
Panton	74
Ripton	46
Starksboro	117
Whiting	26
Weybridge	59
Waltham	24

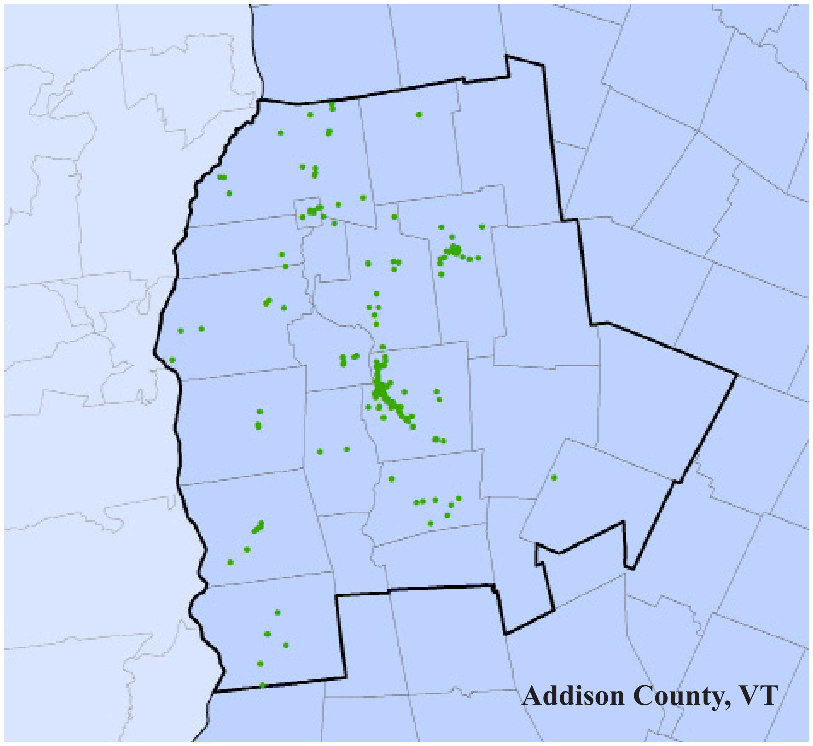

Figure 7. 299 businesses remained after the employee density elimination.

Phase II: Point System

1) Environmental/Community/Health Mission

Rationale: All of the Smart Commute programs that we studied placed a strong emphasis on targeting businesses with preexisting environmental, community, or health missions. In our broad definition, these missions are any statement directed towards sustainability, energy conservation, recycling, community well being, personal health, and preserving the environment. We looked for businesses with direct statements of commitment to one or more of these environmental, community, or health topics. Flamm (2009) notes that while environmental knowledge does not necessarily correspond to environmentally sustainable behavior, environmental attitudes may be more likely to reflect behavior patterns. If we consider mission statements a reflection of companies' attitudes, then they would represent what McKenzie-Mohr (2011) calls a benefit, or motivation, to change behavior. In other words, such statements could reflect a business' willingness to put time, effort, and resources into a program that aligns with its mission. Because we were asked not to contact businesses directly, examining each business' website was our main source of information.

Application: Businesses with websites that had an environmental and/or well-being mission statement were awarded 1 point.

2) Suggested by Community Organizations

Rationale: The existing Smart Commute programs that we studied all began by actively reaching out to local, preexisting, community organizations that possess in-depth knowledge about local businesses. We met with representatives at the following three Middlebury organizations that have in-depth knowledge of Addison County businesses and their leaders.

1) Ben Wilson at Better Middlebury Partnership
2) Sue Hoxie and Andy Mayer at the Addison County Chamber of Commerce
3) Robin Scheu and Billy Connelly at the Addison County Economic Development Corporation

Application: After providing these organizations with a sufficient overview of the Smart Commute program, we obtained several lists of businesses that these leaders thought might be enthusiastic participants. Because these organizations possessed extensive knowledge about business attitudes, employee schedules, and leadership positions, the businesses that they suggested were weighted heavily in our selection of potential second round participants. Businesses were awarded 1 point for each organization that recommended them for the Smart Commute program. Businesses could achieve a maximum of three points under this criterion.

3) Organization Members or Contest Participants

Rationale: Businesses that had already participated in contests related to sustainable transportation, such as Way to Go Vermont, or were already members of sustainability organizations, such as Vermont Businesses for Social Responsibility (VBSR), have shown an inclination for sustainable practices. Where the mission statements indicate a potential for taking action, participation in such activities could confirm environmental attitudes within companies in the first place, which, as Flamm (2009) points out, have the potential to ease the adoption of environmentally sustainable behaviors. The Way to Go Commuter Challenge is a weeklong event that offers awards and prizes for using alternative transportation (bus, carpool, bike, walk etc.), and VBSR is an organization with a mission to "foster an ethic in Vermont that recognizes the opportunity and responsibility of the business community to set a high standard for protecting the natural, human, and economic environments of our citizens" (VBSR, 2012). We concluded that businesses involved in these initiatives would likely be willing to participate in a Smart Commute program.

Application: Businesses that participated in the week-long Way to Go Vermont Commuter Challenge received 1 point, and businesses that are members of Vermont Businesses for Social Responsibility received 1 point.

V. Criteria Results

Once we eliminated businesses by size and density, and awarded points to businesses for the three qualitative criteria, we added up all the points to find the businesses with the most potential for success in a Smart Commute program. The cut-off was a score of two, and no business received a score higher than four. Table 3 shows the distribution of points awarded, and Figure 8 shows the geographic distribution. For point system results for all 299 businesses, reference Appendix Table 1.

Table 3. Top 20 businesses that best fit our criteria and the points they were awarded.
The best score was a 4 out of a possible 6 points.

Business	Town	Employee Count	Environ. & Health Mission	Suggested by Community Orgs.	Organization Members of Contest Participants	Total Points
Country Home Products	Vergennes	250	1	2	1	**4**
Shaw's Supermarket	Middlebury	93	1	3	0	**4**
Middlebury Natural Foods Co-Op	Middlebury	60	1	2	1	**4**
Nathaniel Group Inc.	Vergennes	40	1	2	1	**4**
Porter Hospital Inc.	Middlebury	450	0	3	0	**3**
Helen Porter Nursing Home	Middlebury	160	1	2	0	**3**
Hannaford Supermarket & Pharmacy	Middelbury	100	1	2	0	**3**
Connor Homes Llc	Middlebury	65	0	3	0	**3**
Maple Landmark Woodcraft	Middlebury	30	1	1	1	**3**
Vermont Hard Cider	Middlebury	30	1	2	0	**3**
Good Point Recycling	Middlebury	20	1	2	0	**3**
Goodrich Sensors & Integrd Syst	Vergennes	800	1	0	1	**2**
Counseling Service-Addison	Middlebury	300	1	1	0	**2**
Bread Loaf Corp	Middlebury	100	1	1	0	**2**
Cabot Creamery	Middlebury	95	1	1	0	**2**
Addison Central Supervisory	Middlebury	15	0	2	0	**2**
Vanasse Hangen Brustlin Inc.	North Ferrishburgh	15	1	1	0	**2**
Otter Creek Engineering Inc.	East Middlebury	14	1	1	0	**2**
People's United Bank	Middlebury	12	0	2	0	**2**
Living Well Community Care	Bristol	10	1	1	0	**2**

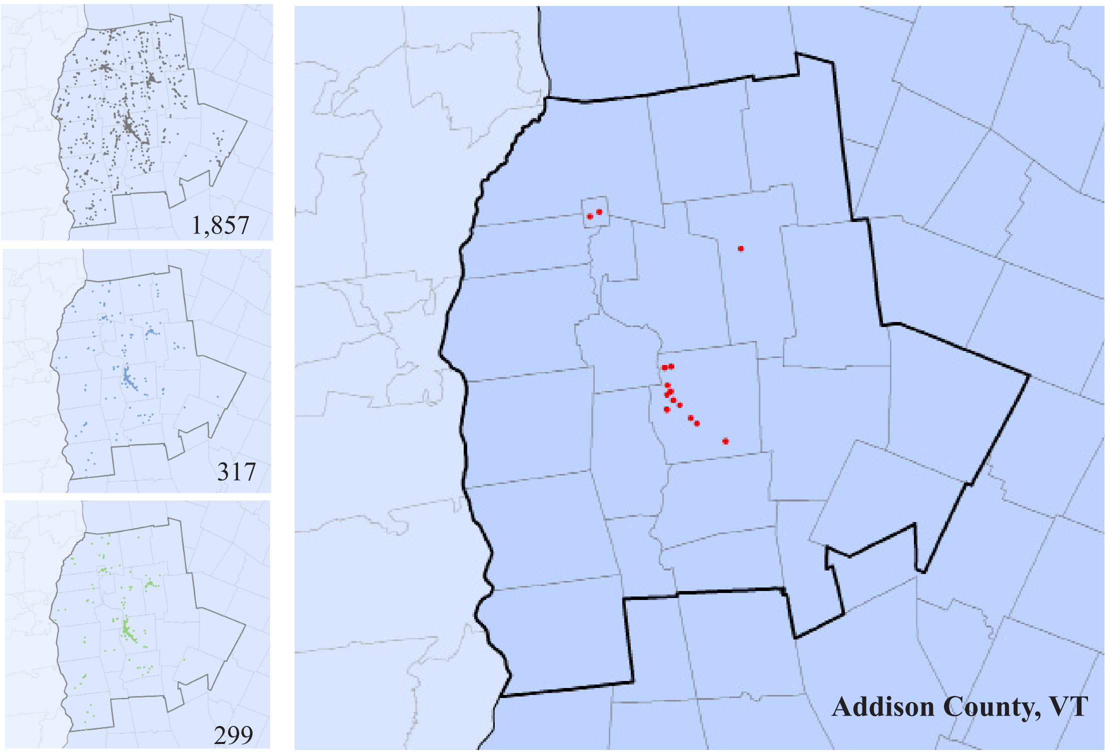

Figure 8. Phase I Eliminations (left) and locations of top 20 businesses (right).

VI. Spatial Analysis

Through the development and application of our criteria, we examined which businesses would most likely succeed in a Smart Commute program. Through spatial analysis, we can take this a step further by targeting businesses that already have high non-SOV commuting potential based on current employee commutes. After we identified the twenty businesses that best met our criteria, the Addison County Chamber of Commerce contacted each business to ask on our behalf for a list of anonymous addresses for their employees. To preserve the potential for a Smart Commute representative to begin communications with businesses on a clean slate, our message did not divulge the details of the program; we noted that if businesses were not comfortable providing addresses, zip codes would suffice. Using the address/zip code data we obtained, we conducted a cluster analysis using the kernel density function in ArcMap 10.1, a Geographic Information Systems (GIS) program. The result of this analysis revealed which businesses have clusters of employees coming from the same areas. By overlaying these clusters with ACTR bus routes and park-and-ride locations, we recommended businesses for the second round of the Smart Commute program that have not only an environmental mission and a recommendation from a location organization, but also easily implementable spatial solutions.

The following maps show our spatial analyses and recommendations for businesses that provided addresses or zip codes.

Recommendations for Living Well Community Care

For Living Well Community Care there are several clusters of employees coming from the Burlington area (1) that have accessibility to the Burlington Link Express. There are also two clusters of employees in Vergennes and Panton (2) that have access to the ACTR Tri-Town route. The majority of this business' employees live within a close proximity to the business (3) and could be encouraged to walk or bike to work. Lastly, there are noteworthy clusters coming from New York (4) and Shoreham (5) that are without access to any existing bus routes, but could be encouraged to carpool.

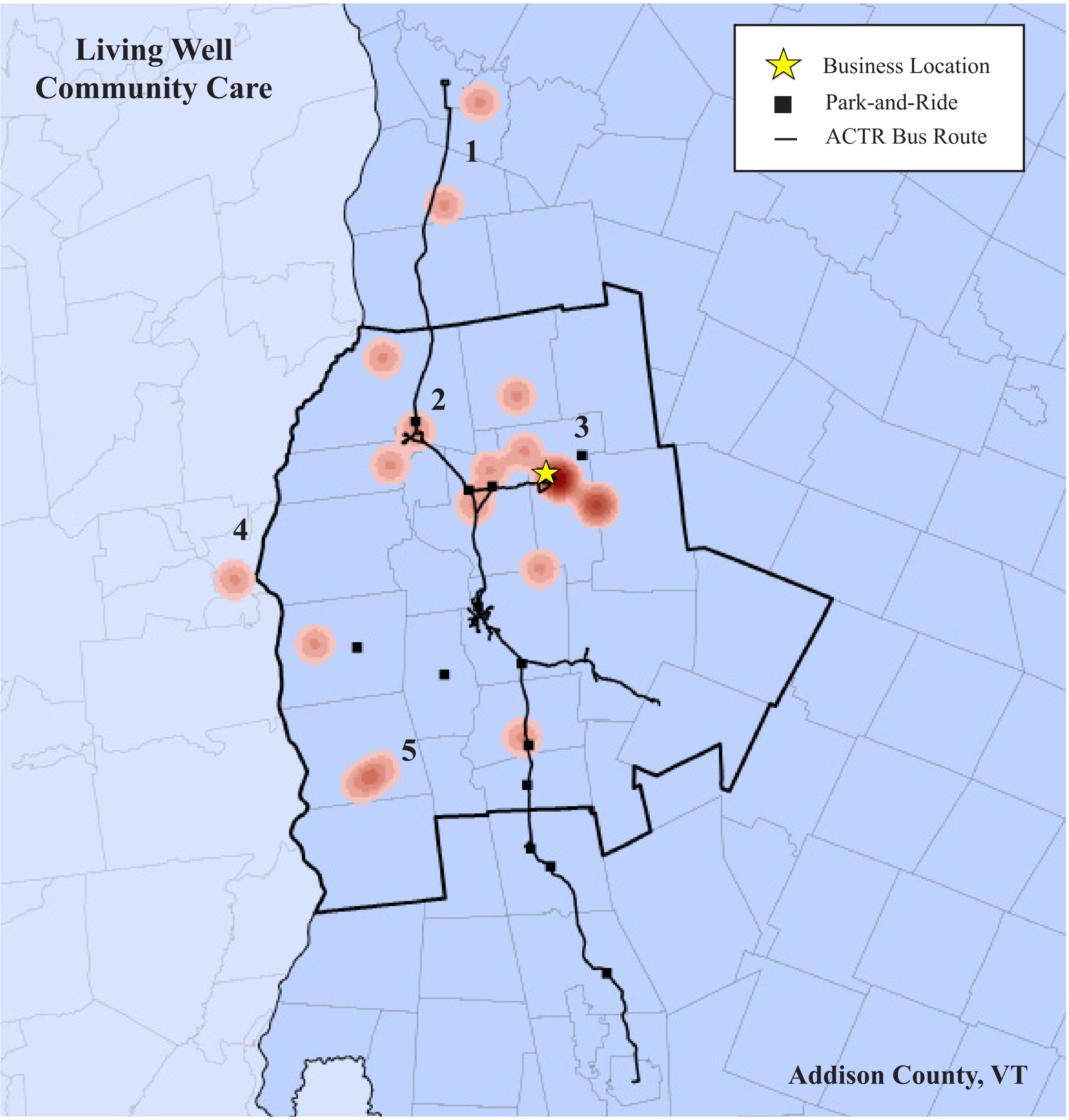

Figure 9. Density Analysis of Living Well Community Care Employee Addresses. Town Boundaries. Cell Size=250, Search Radius= 3,000.

Recommendations for Nathaniel Group Inc.

For Nathaniel Group Inc. there are also several clusters of employees coming from north of the business (1) that have accessibility to the Burlington Link Express. Again, the majority of employees live within the Vergennes zip code (2) and could be encouraged to walk or bike to work. There is also a cluster of employees living in Middlebury (3) with accessibility to the ACTR Tri-Town route.

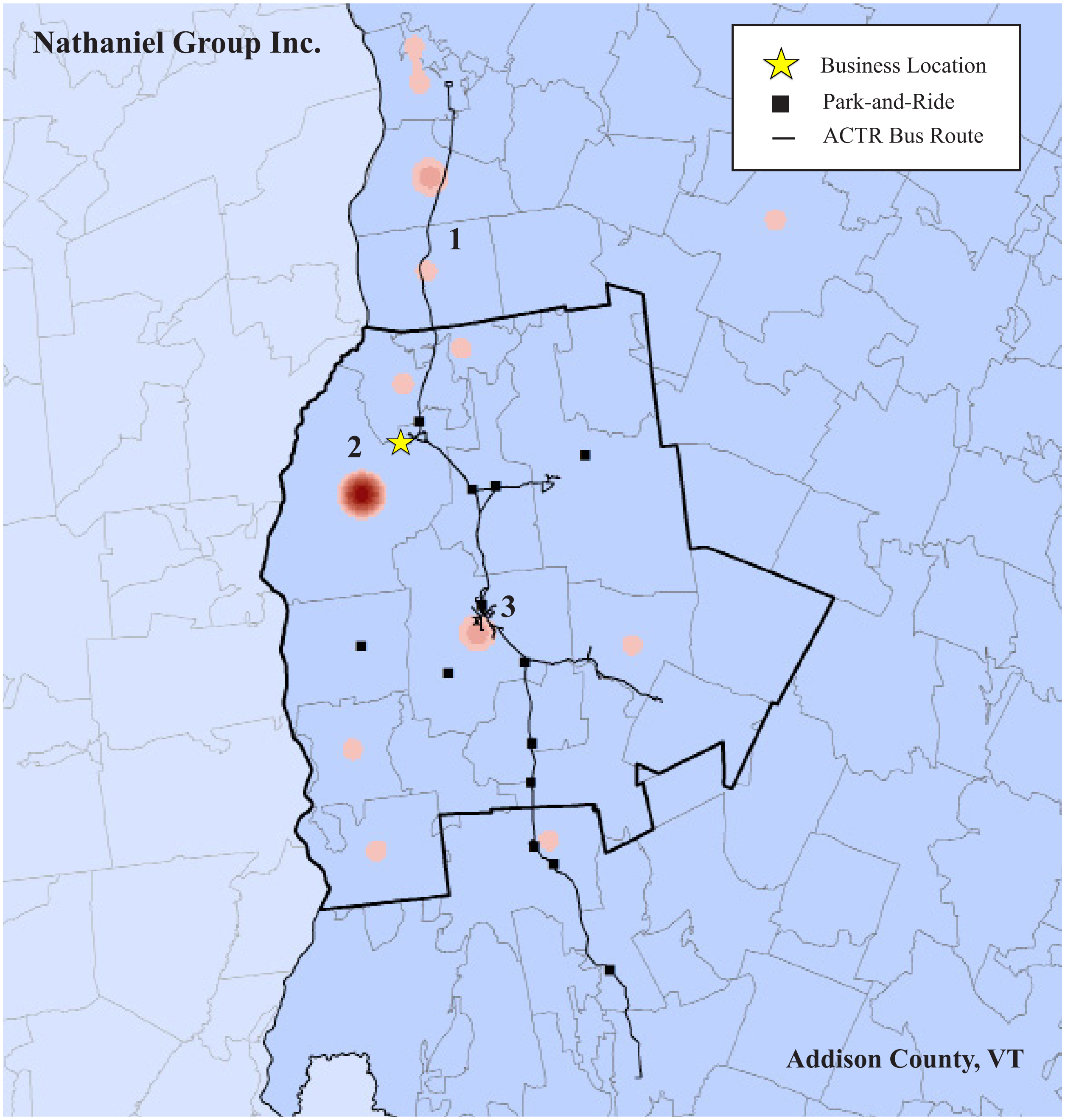

Figure 10. Density Analysis of Nathaniel Group Inc. Employee Zip Codes. Zip Code Boundaries. Cell Size=250, Search Radius= 3,000. Note: When Zip Codes are geocoded, a point is created at the centroid of the zip code area, so the clusters above represent general trends, not specific locations.

Recommendations for Helen Porter Healthcare

Like the previous two businesses, Helen Porter Healthcare has several clusters of employees coming from north of the business (1) that have accessibility to ACTR services. Again, the majority of employees live within the town of Middlebury (2) where the business is located, and could be encouraged to walk or bike to work. As with Living Well Community Care, there are also a cluster of employees coming from New York (3) who could be encouraged to carpool. Unlike the last two businesses, there are several clusters of employees coming from south of the county. In Brandon (4) employees could be encouraged to use the park-and-ride and take the Rutland Connector, and in the greater Rutland area (5) employees could be encouraged to carpool.

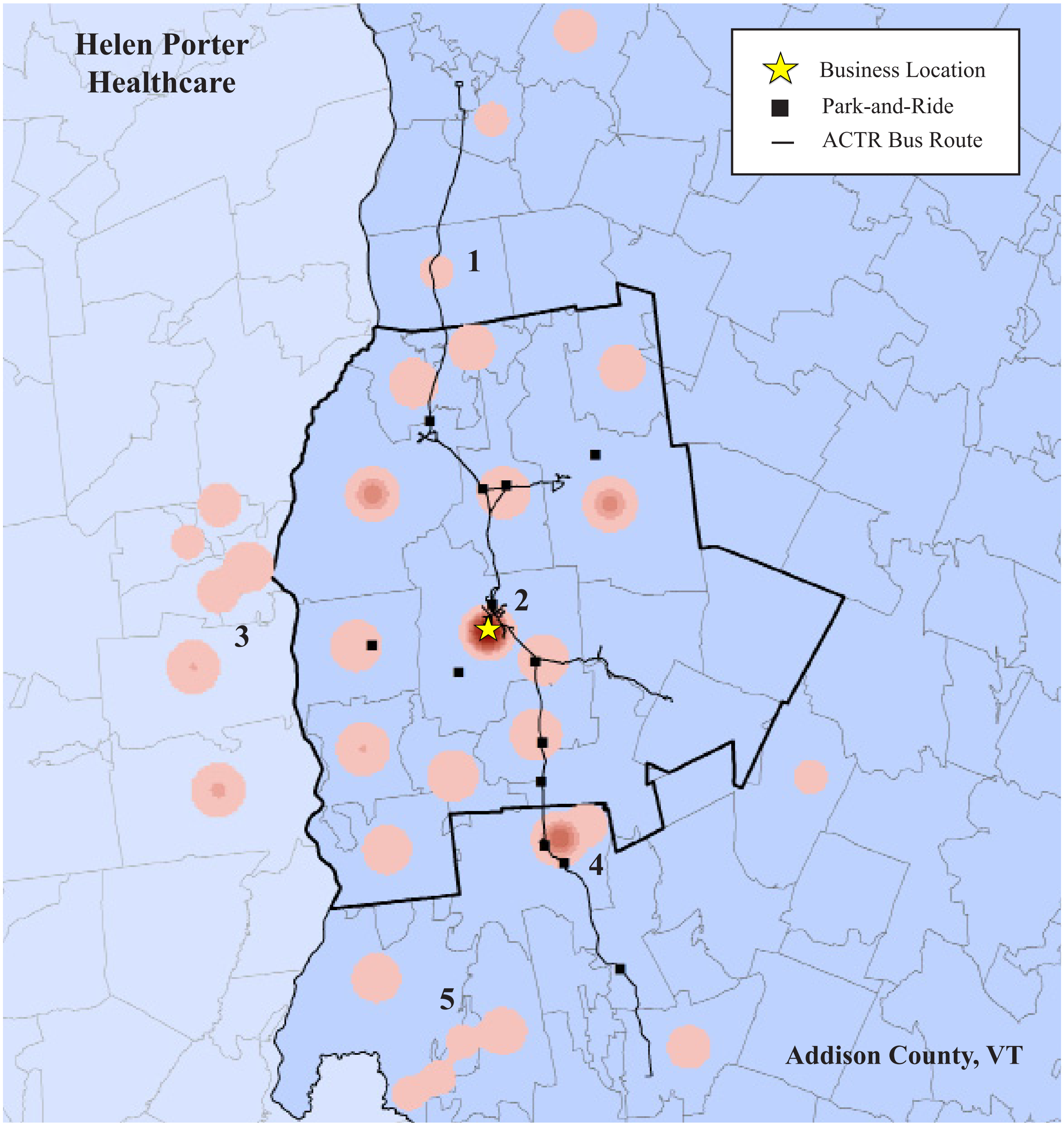

Figure 11. Density Analysis of Helen Porter Healthcare Employee Zip Codes. Zip Code Boundaries. Cell Size=250, Search Radius= 3,000. Note: When Zip Codes are geocoded, a point is created at the centroid of the zip code area, so the clusters above represent general trends, not specific locations.

Recommendations for Maple Landmark Woodcraft

For Maple Landmark Woodcraft there are several clusters in the Bristol and New Haven region (1) that could be encouraged to carpool or use the ACTR Tri-Town route. There is also a cluster in Lincoln (2) without access to the bus route, where employees could be encouraged to carpool. For those employees that live in Middlebury (3), walking, biking, or using ACTR (Middlebury Shuttle), which has a route that goes on Exchange Street (where the business is located), could be encouraged. There is also a cluster of employees coming from Shoreham (4) that do not have access to exiting bus routes, who could be encouraged to carpool.

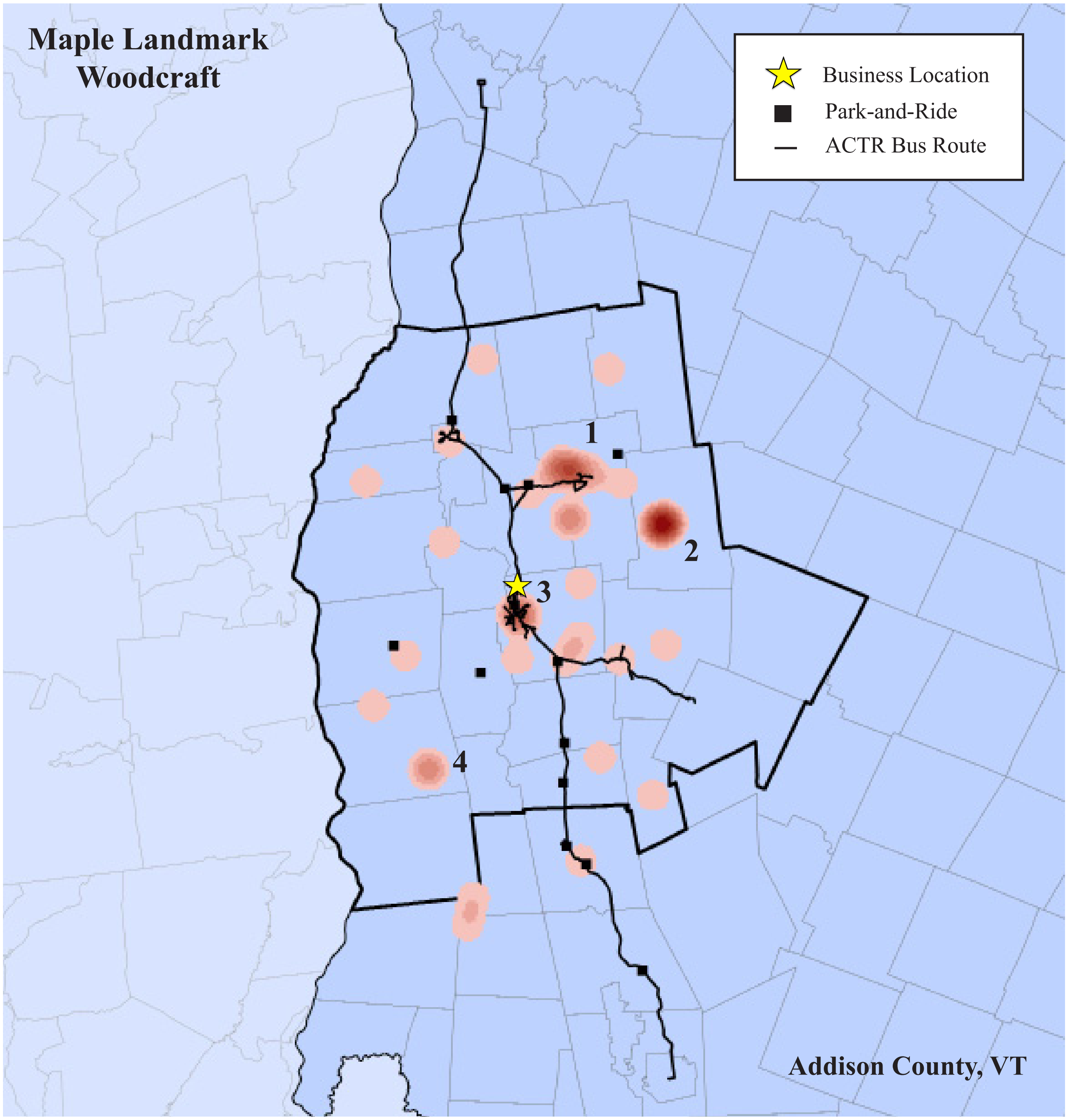

Figure 12. Density Analysis of Maple Landmark Woodcraft Employee Addresses. Town Boundaries. Cell Size=250, Search Radius= 3,000.

Recommendations for Middlebury Natural Foods Co-Op

For Middlebury Natural Food Co-Op the densest cluster is centered around the business (1) so employees could be encouraged to walk or bike to work. Employees living in East Middlebury and Salisbury have convenient access to the bus route (2) and could be encouraged to use ACTR services. The dispersed clusters in the Eastern Addison County towns of Ripton, Lincoln, and Bristol (3), could be encouraged to carpool. As with several of the other businesses there is a cluster of employees coming from New York (4) that could be encouraged to carpool as well.

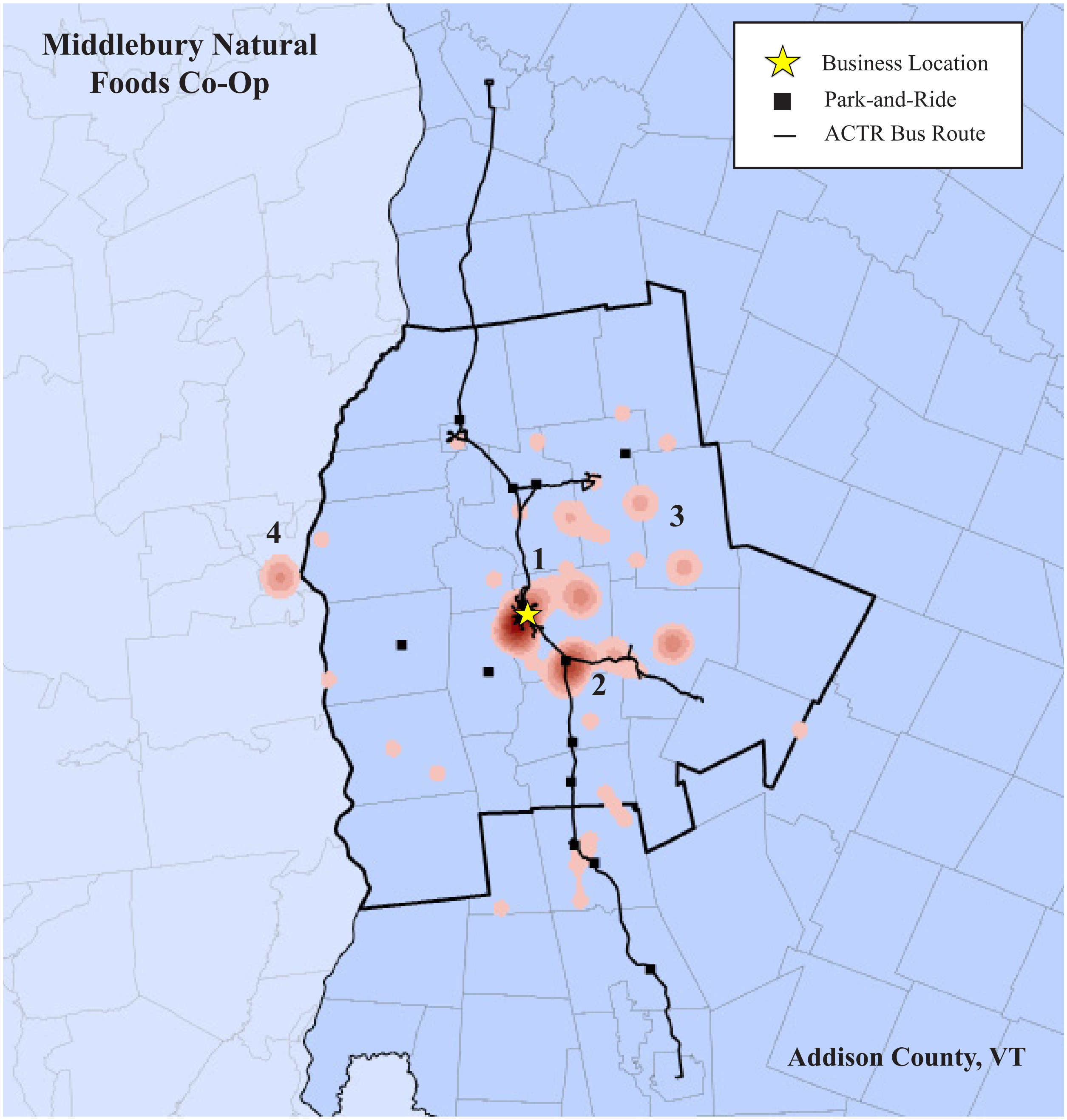

Figure 13. Density Analysis of Middlebury Natural Foods Co-Op Employee Streets Names. Town Boundaries. Cell Size=250, Search Radius= 3,000.

Recommendations for Collaboration

Figures 14 and 15 show overlapping clusters/regions where businesses could collaborate in their Smart Commute efforts. Figure 14 shows the overlapping clusters in Shoreham. Although employees would be traveling to different businesses located in different towns, they could carpool to Middlebury, and then those going to Bristol could take the bus for the rest of their commute. Figure 15 shows the overlapping clusters in New York. Again, although employees may be traveling to different businesses, employees could carpool to a more central location, such as Middlebury, and then walk, bike, or take the bus to their final destination. The most important take away from these two comparisons is that these are the types of overlaps that Addison County Smart Commute should be looking for when doing spatial analyses on potential business participants.

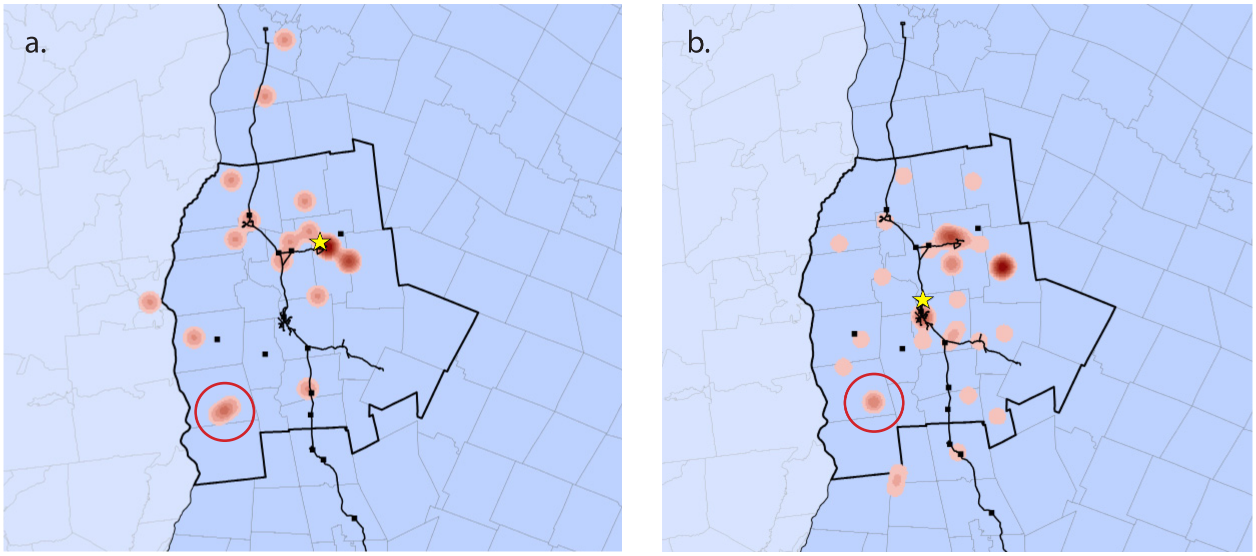

Figure 14. Comparison of (a) Living Well Community Care and (b) Maple Landmark Woodcraft Density Analyses. Cell Size=250, Search Radius= 3,000.

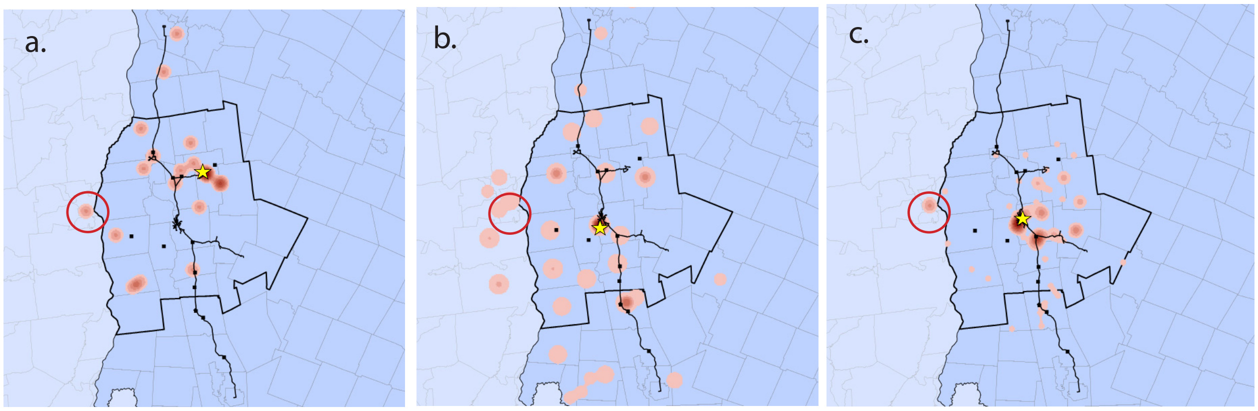

Figure 15. Comparison of (a) Living Well Community Care, (b) Helen Porter Healthcare, (c) and Middlebury Natural Foods Co-Op Density Analyses. Cell Size=250, Search Radius= 3,000.

General Conclusions

First of all, for most businesses, there is a cluster of employees within walking or biking distance. Since these modes have no emissions, they are the most sustainable and most healthy, and should be encouraged whenever possible. In general, there is a lot of accessibility to ACTR services, so increased use of the bus network would be a primary recommendation. However, there are also many clusters outside the range of this network where carpooling would be the most sustainable option at an individual businesses level, and at a collaborative level. To facilitate carpooling we recommend that additional park-and-rides be constructed in high-density areas, such as Lincoln, Shoreham, and on the Vermont side of the Lake Champlain Bridge.

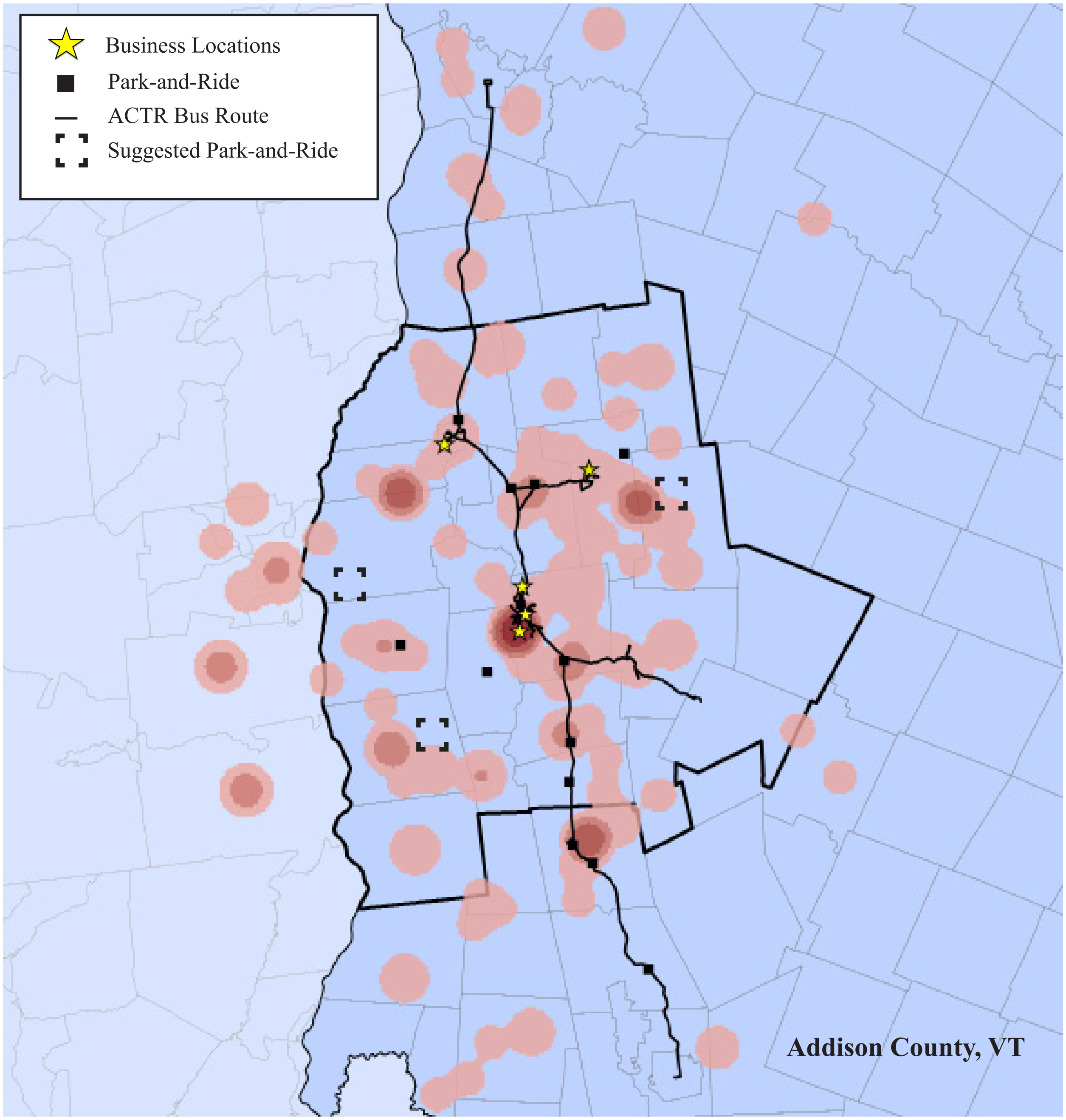

Figure 16. Sum Density Analysis of all five density analyses. Town Boundaries. Cell Size=250, Search Radius= 3,000.

VII. Discussion

As a whole, the criteria development and application and the spatial analysis can be used as a strategy for both selecting potential business participants and providing consultation recommendations. The criteria allowed us to evaluate businesses based on quantitative and qualitative characteristics, while the spatial analysis allowed us to visualize potential areas for commuting improvement and service implementation.

In future rounds of Addison County's Smart Commute program, spatial analysis could be used in two additional ways. One, if implemented earlier it could assist the selection process by highlighting businesses with good connectivity and the potential to carpool. Carpooling is a relatively low-cost service to implement and has the capacity to make vast improvements—in money saved and GHG emissions reduced—depending on how many employees live near each other. By visualizing employee data earlier in the selection process, Smart Commute has the ability to select businesses whose geographic distribution of employees is already amenable to changing commuting behaviors, such as increasing carpooling, with a little up-front cost of coordination. After the Smart Commute program gains momentum and funding within the county, more expensive services could be implemented (extending or adding bus routes, park-and-ride locations, and sidewalks). Second, spatial analysis could be used after the elimination and criteria ranking rounds, as we have in our process, to show to potential businesses participants. Seeing the maps could help in discussing solutions to a business already on board, or convince a more hesitant business of their own potential success with the Addison County Smart Commute program.

Research Limitations

There were three main research limitations in our project. First, the concept of Smart Commute is a fairly new topic in sustainable transportation, and thus there were not an extensive number of programs and/or literature from which to learn. Second, two of the three Smart Commute programs that we were able to research existed in very urban contexts, and thus might not have been perfectly applicable to the program being developed in Addison County. Lastly, we were limited in our ability to directly contact individual businesses, and thus could only obtain information about environmental initiatives from community organizations or business websites, which some of the businesses in Addison County do not possess. There were uncertainties in assuming statements reflected a commitment in practice to the stated mission. Moreover, because we were not able to speak with businesses directly about the program, we were unable to use current employee commuting behavior in our analysis and recommendations. Many of the employees of the businesses we performed spatial analysis on may already carpool, use public transit, or bike to work, but this did not play into our recommendations or conclusions.

Data Limitations

There were two main limitations with our data. First, the employee count for some of the businesses was not correct. For example, the Nathaniel Group is listed as having 40 employees, however, they provided us with zip code data consisting of only 21 entries. We noticed similar instances with other businesses. This is something to be aware of if this data set is used for employee counts in the future. The data set we used is from 2009 and so may be worth updating. Second, the spatial LEHD census data were more limited than we had hoped. We were able to make use of the inflow/outflow data that showed which towns people commute to, but we were not able to fully utilize the other analysis functions available on the LEHD website because the town level was the smallest region on which we could conduct the analyses. Although the option to conduct analysis by census block is available, most of the towns in Addison County are only one census block.

Other Considerations

Rural Smart Commute programs are fairly rare, so one of our limitations involved applying our criteria in an unprecedented way. In the elimination round of the criteria application, we eliminated businesses with fewer than 10 employees and we eliminated businesses in towns with fewer than 150 total workers. These numbers are somewhat arbitrary because there is no definition for a "large" business or "high" density in a rural setting. The U.S. Small Business administration defines a small business as having fewer than 500 employees (U.S. SBA, 2012). Using this standard as our cut-off would have eliminated all but two businesses in Addison County, so we needed to develop our own definition of large and small businesses for the rural setting. A business with 10 or more employees is what we defined to be "large" in this county, which is admittedly somewhat arbitrary and another possible limitation to our work—and a consideration other counties will have to make when choosing how to initially narrow down a business directory.

Early success was an important factor in our criteria development for selecting businesses for the Addison County Smart Commute, thus, we directed our attention towards these larger businesses, as the rural Upper Valley Smart Commute program did. However, it is important to note that future rounds of selection may want to amend the criteria as to include smaller businesses that are clustered together, so that they can collaborate in their Smart Commute efforts, similar to some of the earlier examples we provided.

Lastly, we would also like to comment on evaluating the success of both our criteria and Smart Commute in general. We obtained early validation of our criteria when the four businesses currently in the pilot program actually were among the top potential businesses after applying the point system (Appendix Table 1). However, as the surveying process of these pilot program businesses is just getting underway, their success has not yet been confirmed.

Moving forward, it is necessary to realize that the success we are referring to includes more than an overall reduction in VMTs. While this reduction in VMTs may be the primary goal, smarter commuting has the potential to increase employee happiness, to enhance the atmosphere of the work environment in general, and to increase physical activity by encouraging walking and biking. All of these elements should be considered as measures of success when surveying participating employees. And only by doing so can the program truly obtain an accurate evaluation of both its environmental and social sustainability.

VIII. Conclusions

A program like Smart Commute presents an effective, broad-reaching method of reducing vehicle miles traveled while saving money, improving health, and providing a greater sense of community. McKenzie-Mohr (2011) points out that community-based social marketing helps change behaviors in a sustainable, lasting way. If companies can be considered communities with certain atmospheres, systems, and customs, then the community-based social marketing practices of Smart Commute can reach a broad array of people while still working with intention and specificity.

Smart Commute has the potential to be part of greater initiatives happening in Addison County. For example, another group in this senior seminar investigated the possibility of establishing a TMA in Addison County, which could house the Smart Commute program and connect it to other services and initiatives. Looking more broadly at the region and the state, Smart Commute represents a prime opportunity to reduce GHGs since the transportation sector contributes Vermont's greatest portion of emissions (Sears and Glitman, 2007). Smart Commute addresses the transportation challenges associated with rural regions like this one without forcing an urban model on the region. Instead, it champions values often ascribed to rural regions, such as a sense of tight-knit community.

In fact, because of its development in a rural context, the method for predicting participant success in a Smart Commute program may be the first of its kind. While indebted to the Upper Valley Smart Commute program, the only rural example we were able to find, this project goes further in its aim to provide a concrete model to inspire other rural areas hoping to improve their transportation systems. In the meantime, we hope our prospective businesses can go a long way toward improving transportation here in Addison County.

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IX. Appendix

Table 1. Point System results for all businesses after the Phase I: Elimination round. VBSR = Vermont Businesses for Social Responsibility; BMP = Better Middlebury Partnership; COC = Addison County Chamber of Commerce; ACED = Addison County Economic Development Corporation.

Business	Town	Employee Count	Env. Statement	Way to Go	VBSR	BMP	COC	ACED	Total
Shaw's Supermarket	Middlebury	93	1	0	0	1	1	1	4
Middlebury Natural Foods Co-Op	Middlebury	60	1	0	1		1	1	4
Nathaniel Electronics	Vergennes	40	1	0	1		1	1	4
Country Home Products	Vergennes	250	1	1			1	1	4
Middlebury College	Middlebury	1100	1	1	1				3
Porter Hospital Inc	Middlebury	450	0	0	0	1	1	1	3
Helen Porter Nursing Home	Middlebury	160	1	0	0		1	1	3
Hannaford Supermarket & Phrmcy	Middlebury	100	1	0	0	1	1		3
Connor Homes Llc	Middlebury	65	0	0	0	1	1	1	3
Maple Landmark Woodcraft	Middlebury	30	1	0	1		1		3
Vermont Hard Cider	Middlebury	30	1	0	0	1	1		3
Good Point Recycling	Middlebury	20	1	0	1		1		3
Vermont Community Foundation	Middlebury	17	1	1	1				3
Goodrich Sensors & Intgrd Syst	Vergennes	800	1	1	0				2
Counseling Service-Addison	Middlebury	300	1	0	0		1		2
Middlebury Union High School	Middlebury	109	1	0	0		1		2
Bread Loaf Corp	Middlebury	100	1	0	0		1		2
Cabot Creamery	Middlebury	95	1	0	0		1		2
Middlebury College	Middlebury	80	1	0	1				2
Middlebury Union Middle School	Middlebury	75	0	1	0		1		2
National Bank of Middlebury	Middlebury	63	1	1	0				2
Middlebury College Snowbowl	Middlebury	50	1	0	1				2
Addison Central Supervisory	Middlebury	15		0	0		1	1	2
Otter Creek Engineering Inc	East Middlebury	14	1	0	0		1		2
Living Well Community Care	Bristol	10	1	0	1				2
Vermont Coffee Co	Middlebury	10	1	0	1				2
People's United Bank	Middlebury	12	0			1	1		2
Mt Abraham Union High School	Bristol	165	0	1	0				1
Mary Hogan Elementary School	Middlebury	150	0	0	0		1		1
Keewaydin Camps	Salisbury	125	1	0	0				1
Agri-Mark Inc	Middlebury	90	1	0	0				1
Joseph P Carrara & Sons Inc	Middlebury	90	0	0	0		1		1
Counseling Service of Addison	Middlebury	80	1	0	0				1
Shaw's Supermarket	Vergennes	70	1	0	0				1
A Johnson Co	Bristol	50	1	0	0				1
Danforth Pewterers Ltd	Middlebury	50	0	0	1				1
Fire & Ice Restaurant	Middlebury	50	1	0	0				1
Langrock Sperry & Wool LLP	Middlebury	50	0	1	0				1
Songadeewin-Keewaydin	Salisbury	50	1	0	0				1
Middlebury Inn	Middlebury	43	1	0	0				1
Hannaford Career Ctr	Middlebury	41	1	0	0				1
Patricia Hannaford Career Ctr	Middlebury	41	1	0	0				1
American Flatbread	Middlebury	40	1	0	0				1
Sunrise Orchards	Middlebury	40	1	0	0				1
TJ Maxx	Middlebury	40	1	0	0				1

Business	Town	Employee Count	Env. Statement	Way to Go	VBSR	BMP	COC	ACED	Total
Marble Works Pharmacy Inc	Middlebury	40	0	0	0		1		1
Monument Farms Dairy	Middlebury	37	1	0	0				1
Mc Donald's	Middlebury	35	1	0	0				1
Parent Child Ctr	Middlebury	35	1	0	0				1
Shaw's Supermarket	Bristol	35	1	0	0				1
Counseling Service-Addsn Cnty	Middlebury	30	1	0	0				1
Addison County Home Health Inc	Middlebury	30	0	0	0		1		1
Otter Creek Brewing Inc	Middlebury	30	0	0	0		1		1
Shoreham Elementary School	Shoreham	27	0	0	0		1		1
Casella Waste Management	Middlebury	25	1	0	0				1
J W & De Plumbing & Heating	Vergennes	24	1	0	0				1
Counseling Service of Addison	Middlebury	22	1	0	0				1
Employment Associates	Middlebury	22	1	0	0				1
Courtyard-Middlebury	Middlebury	20	0	1	0				1
Frog Hollow Vt State Craft Ctr	Middlebury	20	1	0	0				1
Honey Gardens Apiaries Inc	Ferrisburgh	20	1	0	0				1
Middlebury Family Health	Middlebury	20	1	0	0				1
Champlain Orchards	Shoreham	16	1	0	0				1
Pike Industries Inc	New Haven	16	1	0	0				1
Ralph Myhre Golf Course	Middlebury	16	1	0	0				1
Bristol Tours	Bristol	15	1	0	0				1
Middelbury Fence Co	Middlebury	15	1	0	0				1
R K Miles Inc	Middlebury	15	1	0	0				1
VHB Pioneer	N Ferrisburgh	15	1	0	0				1
Windstream Power LLC	N Ferrisburgh	15	1	0	0				1
Roundtree Construction	New Haven	14	1	0	0				1
Health DEPT-WIC	Middlebury	13	1	0	0				1
Otter Creek Bakery	Middlebury	13	0	1	0				1
Vermont Energy Co	Ferrisburgh	13	1	0	0				1
Casella Waste Mgt	Bridport	12	1	0	0				1
Mountain Greens Market	Bristol	12	0	0	1				1
Shoreham Inn	Shoreham	12	1	0	0				1
Starry Night Cafe	Ferrisburgh	12	1	0	0				1
Storm Cafe	Middlebury	12	1	0	0				1
Vermont Adult Learning Child	Middlebury	12	0	1	0				1
Vermont Book Shop Inc	Middlebury	12	0	0	1				1
Lebeau & O'Brien Exxon Station	Vergennes	11	1	0	0				1
Stark Mountain Woodworking Co	New Haven	11	1	0	0				1
Phelps Engineering Inc	Middlebury	11	0	0	0		1		1
Button Bay State Park	Vergennes	10	1	0	0				1
Keewaydin Foundation	Salisbury	10	1	0	0				1
Misty Knoll Farm	New Haven	10	1	0	0				1
SUBWAY	Middlebury	10	1	0	0				1
Ultramar	Middlebury	10	1	0	0				1
Vermont Natural AG Products	Middlebury	10	1	0	0				1

Business	Town	Employee Count	Env. Statement	Way to Go	VBSR	BMP	COC	ACED	Total
Cameron Construction Co (Venasse)	N Ferrisburgh	10	0	0	0		1		1
Lodge at Otter Creek	Middlebury	80	0				1		1
Basin Harbor Club Golf Course	Vergennes	350	0	0	0				0
Monahan Filaments	Middlebury	125	0	0	0				0
Bet-Cha Transit Inc	Middlebury	115	0	0	0				0
Bristol Elementary School	Bristol	88	0	0	0				0
Vergennes High School	Vergennes	82	0	0	0				0
Retail Vision	Middlebury	80	0	0	0				0
U I Insurance Svc Inc	Middlebury	80	0	0	0				0
F & M Leasing Corp	Middlebury	70	0	0	0				0
Vergennes Elementary School	Vergennes	70	0	0	0				0
Champlain Valley Academy	Middlebury	65	0	0	0				0
Geiger of Austria Inc	Middlebury	65	0	0	0				0
Co-Operative Insurance Co	Middlebury	63	0	0	0				0
Elderly Service Inc	Middlebury	63	0	0	0				0
Rosie's Restaurant	Middlebury	60	0	0	0				0
Foster Motors Inc	Middlebury	58	0	0	0				0
Middlebury Town Clerk	Middlebury	55	0	0	0				0
Whiting Elementary School	Whiting	55	0	0	0				0
Greg's Meat Market	Middlebury	50	0	0	0				0
Robinson Elementary School	Starksboro	50	0	0	0				0
Town Manager	Middlebury	50	0	0	0				0
Vermont Plywood LLC	West Burke	50	0	0	0				0
Ferrisburgh Central School	Ferrisburgh	46	0	0	0				0
Gailer School	Middlebury	45	0	0	0				0
North Branch School	Ripton	45	0	0	0				0
Dock Doctors	Ferrisburgh	40	0	0	0				0
G Stone Motors Inc	Middlebury	40	0	0	0				0
Monkton School	Monkton	40	0	0	0				0
Addison Central School	Vergennes	35	0	0	0				0
Champlain Valley Equipment Inc	Middlebury	35	0	0	0				0
Tully & Marie's Inc	Middlebury	35	0	0	0				0
Two Brothers Tavern	Middlebury	35	0	0	0				0
Hamilton Farm & Shop	Middlebury	34	0	0	0				0
Orwell Village School	Orwell	33	0	0	0				0
Bristol Village Fire Dept	Bristol	32	0	0	0				0
Durasol Systmes Inc	Middlebury	32	0	0	0				0
Rouse Tire Sales Inc	Middlebury	32	0	0	0				0
Rouse Tire Sales Inc	Middlebury	32	0	0	0				0
Addison County Independent	Middlebury	30	0	0	0				0
Beau Ties Ltd of Vermont	Middlebury	30	0	0	0				0
Beeman Elementary School	New Haven	30	0	0	0				0
Bristol Village Fire Dept	Bristol	30	0	0	0				0
Champlain Construction Inc	Middlebury	30	0	0	0				0
Denecker Chevrolet Inc	Vergennes	30	0	0	0				0

Business	Town	Employee Count	Env. Statement	Way to Go	VBSR	BMP	COC	ACED	Total
Hungry Bear On Main Street	Vergennes	30	0	0	0				0
Lincoln Community School	Lincoln	30	0	0	0				0
New Haven Fire Dept	New Haven	30	0	0	0				0
PHS Inc	Middlebury	30	0	0	0				0
Red Mill Restaurant	Ferrisburgh	30	0	0	0				0
VERMONT Bicycle Touring	Bristol	30	0	0	0				0
Waybury Inn	Middlebury	30	0	0	0				0
A&W All-American Food	Middlebury	28	0	0	0				0
Bridport Elementary School	Bridport	28	0	0	0				0
Shea Motor Co	Middlebury	26	0	0	0				0
Weybridge Elementary School	Middlebury	26	0	0	0				0
Bobcat Cafe	Bristol	25	0	0	0				0
Cubbers Restaurant	Bristol	25	0	0	0				0
Hendy Brothers Inc	Middlebury	25	0	0	0				0
Kinney Drugs	Vergennes	25	0	0	0				0
Lake Champlain Maritime Museum	Vergennes	25	0	0	0				0
Mary Johnson Children's Ctr	Middlebury	25	0	0	0				0
Middlebury Fence Co	New Haven	25	0	0	0				0
Mill Bridge Construction Inc	Middlebury	25	0	0	0				0
Salisbury Elementary School	Salisbury	24	0	0	0				0
Addison County Sheriff's Dept	Middlebury	20	0	0	0				0
Addison Fire Station	Vergennes	20	0	0	0				0
Champlain Valley Plumbing	Bristol	20	0	0	0				0
Ferrisburg Town Fire Dept	Ferrisburgh	20	0	0	0				0
Fire Dept	Vergennes	20	0	0	0				0
Green Peppers Restaurant	Middlebury	20	0	0	0				0
Martin's Hardware & Bldg Supl	Middlebury	20	0	0	0				0
Medicaid Transportation	Middlebury	20	0	0	0				0
Middlebury Fire Dept	Middlebury	20	0	0	0				0
Mister Ups Restaurant	Middlebury	20	0	0	0				0
Panton Fire Warden	Vergennes	20	0	0	0				0
Salisbury Fire Dept	Salisbury	20	0	0	0				0
Shard Villa	Salisbury	20	0	0	0				0
Shoreham Fire Dept	Shoreham	20	0	0	0				0
Swift House Inn	Middlebury	20	0	0	0				0
Town Fire Station	Middlebury	20	0	0	0				0
US Post Office	Middlebury	20	0	0	0				0
Vergennes Residential Care	Vergennes	20	0	0	0				0
Vermont State Police	New Haven	20	0	0	0				0
Vermont Sun Sports & Fitness	Middlebury	20	0	0	0				0
Weybridge Fire Warden	Middlebury	20	0	0	0				0
Fyles Brothers Inc	Orwell	19	0	0	0				0
Shoreham Long Distance	Shoreham	19	0	0	0				0
Spruce Gardens	Vergennes	19	0	0	0				0
Vergennes Variety	Vergennes	19	0	0	0				0

Business	Town	Employee Count	Env. Statement	Way to Go	VBSR	BMP	COC	ACED	Total
Vermont Country Soap Corp	Middlebury	19	0	0	0				0
Cornwall Elementary School	Middlebury	18	0	0	0				0
First National Bank of Orwell	Orwell	18	0	0	0				0
Goodro Lumber Co	East Middlebury	18	0	0	0				0
Shoreham Telephone Co Inc	Shoreham	18	0	0	0				0
A&W All-American Food	Middlebury	17	0	0	0				0
Police Dept	Middlebury	17	0	0	0				0
Social Welfare Dept	Middlebury	17	0	0	0				0
Haven Crushed Stone	New Haven	16	0		0				0
Mary's at Baldwin Creek	Bristol	16	0	0	0				0
Neil & Otto's Pizza Cellar	Middlebury	16	0	0	0				0
WFAD	Middlebury	16	0	0	0				0
Addison County Emergency Food	Middlebury	15	0	0	0				0
Addison Northeast Special Ed	Bristol	15	0	0	0				0
Addison School Superintendent	Bristol	15	0	0	0				0
Black Sheep Bistro	Vergennes	15	0	0	0				0
Bourdeau Brothers	Middlebury	15	0	0	0				0
Champlain Valley Christian	Vergennes	15	0	0	0				0
Ferrisburg Artisans Guild	Ferrisburgh	15	0	0	0				0
Kennedy Bros Factory Mrktpl	Vergennes	15	0	0	0				0
Public Works	Middlebury	15	0	0	0				0
Rocky Dale Gardens	Bristol	15	0	0	0				0
Alpine Shop	Middlebury	14	0	0	0				0
Bristol Dental Group	Middlebury	14	0	0	0				0
Champlain Valley Christian Sch	Vergennes	14	0	0	0				0
Dundon Plumbing & Heating	Orwell	14	0	0	0				0
Middlebury Agway Farm & Garden	Middlebury	14	0	0	0				0
Middlebury Twn Recreation Pool	Middlebury	14	0	0	0				0
Otter Creek Child Ctr	Middlebury	14	0	0	0				0
Weybridge Fire Dept	Middlebury	14	0	0	0				0
Champlain Valley Orthopedics	Middlebury	13	0	0	0				0
Chittenden Bank	Middlebury	13	0	0	0				0
Kinney Drugs	Middlebury	13	0	0	0				0
Middlebury Market & Cafe	Middlebury	13	0	0	0				0
Millborne Dairy	Shoreham	13	0	0	0				0
Porter Rehab & Orthopedic Svc	Middlebury	13	0	0	0				0
Pratt's Store Inc	Bridport	13	0	0	0				0
Shoreham Service Ctr Store	Shoreham	13	0	0	0				0
Shoreman Service Ctr	Shoreham	13	0	0	0				0
St Mary's School	Middlebury	13	0	0	0				0
Three Squares Cafe	Vergennes	13	0	0	0				0
US Post Office	Vergennes	13	0	0	0				0
Addison NW Supervisory Union	Vergennes	12	0	0	0				0
Ben Franklin	Middlebury	12	0	0	0				0
Bridport Town Garage	Bristol	12	0	0	0				0

Business	Town	Employee Count	Env. Statement	Way to Go	VBSR	BMP	COC	ACED	Total
Bristol Bakery & Cafe LLC	Bristol	12	0	0	0				0
Broughton's True Value	Bridport	12	0	0	0				0
Brown's Certified Welding	Bristol	12	0	0	0				0
Brown's Crane Svc	Bristol	12	0	0	0				0
Brown's Tree & Aerial Svc	Bristol	12	0	0	0				0
Cedar Ledge Family Practice	Middlebury	12	0	0	0				0
Coldwell Banker	Middlebury	12	0	0	0				0
Dan's Place	Bristol	12	0	0	0				0
Dubois Farm Inc	Vergennes	12	0	0	0				0
Family Services	Middlebury	12	0	0	0				0
Jeremiah Parker Restoration	Shoreham	12	0	0	0				0
Junction Auto Ctr	New Haven	12	0	0	0				0
Mac Intyre Plumbing & Heating	Middlebury	12	0	0	0				0
Martin's Hardware & Bldg Supl	Bristol	12	0	0	0				0
Olympia Sports	Middlebury	12	0	0	0				0
Rainbow Pediatrics	Middlebury	12	0	0	0				0
Rite Aid	Middlebury	12	0	0	0				0
Soma Work Massage & Beata	Middlebury	12	0	0	0				0
Steady Transport	Vergennes	12	0	0	0				0
Timberline Interactive Inc	Middlebury	12	0	0	0				0
UGI Energy Svc Inc	Vergennes	12	0	0	0				0
Vergennes Animal Hospital	Vergennes	12	0	0	0				0
Bristol Family Ctr	Bristol	11	0	0	0				0
Bud Carpenter Inc	Orwell	11	0	0	0				0
Div of Alcohol & Drug Abuse	Middlebury	11	0	0	0				0
G Stone Commercial	Middlebury	11	0	0	0				0
Hungry Mind Cafe	Middlebury	11	0	0	0				0
Lang Mclaughry Spera	Middlebury	11	0	0	0				0
Mountain Health Ctr	Bristol	11	0	0	0				0
Steve's Park Diner	Middlebury	11	0	0	0				0
WIZN	Vergennes	11	0	0	0				0
1796 House	New Haven	10	0	0	0				0
Addison County Cmmssn Sales	Middlebury	10	0	0	0				0
Adirondack Guide Boat	N Ferrisburgh	10	0	0	0				0
Arnold Bay Farm	Vergennes	10	0	0	0				0
Aubuchon Hardware	Middlebury	10	0	0	0				0
Bristol Health & Fitness	Bristol	10	0	0	0				0
Buxton's Store	Orwell	10	0	0	0				0
Camp Greylock	Burlington	10	0	0	0				0
Champlain Bridge Marina Inc	Vergennes	10	0	0	0				0
Champlain Discount Foods	Vergennes	10	0	0	0				0
Champlain Valley Cardiovsclr	Middlebury	10	0	0	0				0
Chittenden Bank	Vergennes	10	0	0	0				0
Counseling Service-Addison	Middlebury	10	0	0	0				0
Deppman & Foley	Middlebury	10	0	0	0				0

Business	Town	Employee Count	Env. Statement	Way to Go	VBSR	BMP	COC	ACED	Total
H&R Block	Middlebury	10	0	0	0				0
Happy Valley Orchard Apple	Middlebury	10	0	0	0				0
Jackman's Inc	Bristol	10	0	0	0				0
Lake Dunmore Kampersville	Salisbury	10	0	0	0				0
Livingston Farm Landscape	Bristol	10	0	0	0				0
Luigi's Italian Specialties	Vergennes	10	0	0	0				0
Macintyre Services LLC	Middlebury	10	0	0	0				0
Maple Meadow Farm	Salisbury	10	0	0	0				0
Mid Short Stop	Middlebury	10	0	0	0				0
Middlebury Animal Hospital	Middlebury	10	0	0	0				0
Middlebury Fitness	Middlebury	10	0	0	0				0
Misasi & Misasi	Middlebury	10	0	0	0				0
New Haven Tire Ctr	New Haven	10	0	0	0				0
Number One Auto Parts	Middlebury	10	0	0	0				0
Police Dept	Vergennes	10	0	0	0				0
Rockydale Pizza	Bristol	10	0	0	0				0
Roland's Place	New Haven	10	0	0	0				0
Senix Corp	Bristol	10	0	0	0				0
UPS Store	Middlebury	10	0	0	0				0
US Post Office	Bristol	10	0	0	0				0
Vergennes City Clerk	Vergennes	10	0	0	0				0
West Addison General Store	Vergennes	10	0	0	0				0
Wow Toyz	Vergennes	10	0	0	0				0

Table 2. Inflow-Outlow and Top Destinations for all 23 towns in Addison County. The number in parentheses next to the town name = the number of employees commuting to that location.

Addison	
Job Inflow	245
Live/Work jobs	23
Job Ouflow	647
Top Location of Job Outflow	Middlebury (213)
Top Location of Job Inflow	New Haven (35)
Bridport	
Job Inflow	139
Live/Work jobs	26
Job Ouflow	516
Top Location of Job Outflow	Middlebury (180)
Top Location of Job Inflow	Cornwall (28)
Bristol	
Job Inflow	745
Live/Work jobs	340
Job Ouflow	1,483
Top Location of Job Outflow	Middlebury (389)
Top Location of Job Inflow	Bristol (340)
Cornwall	
Job Inflow	51
Live/Work jobs	7
Job Ouflow	456
Top Location of Job Outflow	Middlebury (182)
Top Location of Job Inflow	Bridport (11)
Ferrisburgh	
Job Inflow	627
Live/Work jobs	167
Job Ouflow	1,121
Top Location of Job Outflow	Burlington (189)
Top Location of Job Inflow	Ferrisburgh (167)
Goshen	
Job Inflow	13
Live/Work jobs	0
Job Ouflow	94
Top Location of Job Outflow	Middlebury (19)
Top Location of Job Inflow	Granville (4)

Granville	
Job Inflow	22
Live/Work jobs	2
Job Ouflow	119
Top Location of Job Outflow	Middlebury (20)
Top Location of Job Inflow	Lincoln (5)
Hancock	
Job Inflow	30
Live/Work jobs	5
Job Ouflow	160
Top Location of Job Outflow	Middlebury (21)
Top Location of Job Inflow	Lincoln (9)
Leicester	
Job Inflow	37
Live/Work jobs	9
Job Ouflow	446
Top Location of Job Outflow	Middlebury (172)
Top Location of Job Inflow	Salisbury (13)
Lincoln	
Job Inflow	50
Live/Work jobs	14
Job Ouflow	463
Top Location of Job Outflow	Middlebury (66)
Top Location of Job Inflow	Lincoln (14)
Middlebury	
Job Inflow	4843
Live/Work jobs	1468
Job Ouflow	1,124
Top Location of Job Outflow	Middlebury (1468)
Top Location of Job Inflow	Middlebury (1468)
Monkton	
Job Inflow	129
Live/Work jobs	31
Job Ouflow	815
Top Location of Job Outflow	Burlington (130)
Top Location of Job Inflow	Starksboro (39)

New Haven	
Job Inflow	544
Live/Work jobs	59
Job Ouflow	711
Top Location of Job Outflow	Middlebury (239)
Top Location of Job Inflow	New Haven (59)
Orwell	
Job Inflow	144
Live/Work jobs	29
Job Ouflow	477
Top Location of Job Outflow	Middlebury (204)
Top Location of Job Inflow	Shoreham (31)
Panton	
Job Inflow	72
Live/Work jobs	2
Job Ouflow	312
Top Location of Job Outflow	Middlebury (92)
Top Location of Job Inflow	New Haven (9)
Ripton	
Job Inflow	39
Live/Work jobs	7
Job Ouflow	204
Top Location of Job Outflow	Middlebury (35)
Top Location of Job Inflow	Hancock (10)
Salisbury	
Job Inflow	126
Live/Work jobs	46
Job Ouflow	460
Top Location of Job Outflow	Middlebury (194)
Top Location of Job Inflow	Salisbury (46)
Shoreham	
Job Inflow	137
Live/Work jobs	29
Job Ouflow	467
Top Location of Job Outflow	Middlebury (200)
Top Location of Job Inflow	Bridport (31)

Starksboro	
Job Inflow	98
Live/Work jobs	19
Job Ouflow	838
Top Location of Job Outflow	Burlington (112)
Top Location of Job Inflow	Monkton (21)
Vergennes	
Job Inflow	1,129
Live/Work jobs	232
Job Ouflow	989
Top Location of Job Outflow	Vergennes (232)
Top Location of Job Inflow	Vergennes (232)
Whiting	
Job Inflow	26
Live/Work jobs	0
Job Ouflow	148
Top Location of Job Outflow	Middlebury (52)
Top Location of Job Inflow	Bridport (5)
Weybridge	
Job Inflow	56
Live/Work jobs	3
Job Ouflow	384
Top Location of Job Outflow	Middlebury (130)
Top Location of Job Inflow	New Haven (13)
Waltham	
Job Inflow	24
Live/Work jobs	0
Job Ouflow	212
Top Location of Job Outflow	Middlebury (57)
Top Location of Job Inflow	Webridge (3)